THE

VETERINARY JOURNAL

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OCTOBER, 1928.

Editorials

THE LATE SIR THEODORE COOK.

By the death of Sir Theodore Cook, the Editor of *The Field*, the veterinary profession has lost a good friend—not only as a well wisher, but an earnest worker on our behalf—the real amount of whose work will never really be known. The columns of *The Field* were always open to articles on matters of interest between the veterinary world and the public, and Sir Theodore Cook has said many nice things about the work of the profession especially doing his best to illustrate to the animal owning public the value of the scientifically trained man over the quack. The Field Distemper Fund, which has in four years succeeded in raising the sum of £25,000 for research into the troublesome canine ailment, owes the payment of all the expenses necessitated by its appeal and collection to the generosity of Sir Theodore Cook; as it was to him that the two gentlemen who originated the idea of a Distemper Research Fund went.

The first idea was to ask for £15,000; but, on Sir Theodore's advice, this was changed to £25,000, and it must have been a source of gratification to him that he saw the whole of this large amount voluntarily subscribed.

The value of the work which, if the results are confirmed, will rid the canine world of a dangerous incubus, is inestimable. Not only

XUM

has the matter been a success financially, but those who have been making the observations (Dr. P. Laidlaw and Major Dunkin, M.R.C.V.S., D.V.H.) have reason to hope that they have at last found a preventative —and a preventative is as good as—or perhaps even better than—a cure in the economy of its results.

THE LATE MR. WM. BROWN, B.Sc., M.R.C.V.S.

WITH the " passing " of Willie Brown, the veterinary profession, especially that portion of it which forms the National Veterinary Association, has lost a staunch friend and supporter. As Lecturer in Veterinary Hygiene in the University of Aberdeen, " Willie " Brown had made many friends amongst those of the agricultural world and his ready Scotch humour made him a favourite at all social gatherings.

The Council of the Royal College of Veterinary Surgeons selected him as one of the Examiners in Hygiene on the Examination Board, a position which he had occupied for some years.

A regular attendant and speaker at the meetings of the National, Mr. Brown's genial jokes will be missed by many and his absence regretted by all.

General Articles

A VETERINARY COLLEGE FOR NORWAY.

By PROFESSOR HOLTHS,

Director of the Veterinary Institute, Oslo, Norway.

OUR country has as yet no veterinary college, and our veterinarians have therefore been compelled to obtain their education at veterinary institutions abroad, usually selecting Sweden, Denmark, Germany or Austria.

Owing to the lack of a Norwegian veterinary college our country was for a long time insufficiently supplied with qualified Veterinary Surgeons, and in many respects this has had an unfavourable influence on the development of our agriculture, as the want of such a teaching institute has rendered it difficult for our veterinarians to keep themselves up to date in their profession and to secure the further education which the rapid development of veterinary science renders necessary.

Our authorities have been fully aware of the importance of the matter, but lack of funds has constantly caused the question of the establishment of a veterinary college to be postponed. Thus the Storthing* had already in 1818 resolved to establish such a college, but the expense was found to be too great, and subsequently a number of plans have been submitted, which likewise led to no result.

It was not until 1890 that a small beginning was made, a grant being obtained for the erection of a veterinary laboratory, which was intended to be of assistance to the veterinarians in dealing with difficult cases of illness and especially in infectious diseases of livestock. Subsequently, a grant was obtained for the holding of annual courses for older veterinarians, whilst the laboratory commenced the production of tuberculin for the purpose of combating tuberculosis in domestic animals. Since 1892 efforts on a very large scale in proportion to our resources have been made to combat this disease.

A further step forward was taken in 1911, when the Storthing granted the necessary funds for the erection of the present Veterinary Institute at Oslo, and this was ready for use in 1914.

The Institute is directly subject to the Department of Agriculture and is administered by a Director, who bears the title of professor and is paid on the same scale as professors of the University. Under him there are two sectional chiefs, with the same salary as lecturers at the University; one male and two female helpers, as well as

* The Parliament.

the necessary technical assistance. The Institute's working budget for the past year is as follows:—

Salaries	*kr.	37,800
Working Expenses	,,	58,000
Total	kr.	95,800
Estimated Income	,,	20,000

The Veterinary Institute acts as adviser to the Department of Agriculture and to the Veterinary Director-General in everything concerning diseases of livestock, carries out all kinds of diagnostic investigations of material submitted, produces tuberculin, mallein and other diagnostic preparations, as well as sera and vaccines against infectious diseases of animals, to the extent that circumstances demand.

All diagnostic investigations (including chemical) are performed gratis, while a charge is made for immune-sera. The prices, however, are so low that the sale of these preparations, which are supplied only to veterinarians, covers only part of the costs of production.

By an act of the 12th April, 1918, it was finally resolved to establish a veterinary college in Oslo and thereby this long-existing question was brought to a preliminary solution.

After a site adjacent to the Veterinary Institute had been purchased and the necessary detailed designs had been prepared the work of erection was commenced. Owing to the high prices prevailing and the smallness of the grants, the building operations however proceeded slowly. Nevertheless, we have succeeded in getting all the building erected and roofed in, with the exception of the dissection building, the shoeing forge, and a small structure for anatomical preparations; but the heating, ventilation, and sanitary installations, and the interior fittings still remain to be carried out. We hope, however, to be able to complete one of the clinical buildings, for which we have means in hand, and to get it into operation this year. The intention is that this clinic shall be used for instructional purposes in connection with the annual courses for veterinarians, as well as serving as a research institute in regard to those diseases of animals which play an important role in agricultural economy.

The buildings already erected and to be erected which are necessary for the instructional work are the following:—

I.—The Main Building.—This contains accommodation for the central heating plant, common-rooms for the students, cloakrooms, baths, accommodation for the pathologic-anatomical section, the anatomical section, the sections for zootechnics and hygiene, farriery and

* At the present rate of exchange £1 equals kr. 18·05.

surgical studies, the offices of the College, classrooms, photographic rooms, and a lecture theatre. On each side of this building stand:

II.—THE MEDICAL CLINIC—divided into a number of sections with workrooms, laboratory, cloakrooms, etc.

III.—THE SURGICAL CLINIC, Obstetric Clinic and Ambulatory Clinic, all under the same roof, with operation rooms, Röntgen Ray Room, etc.

IV.—Behind this latter building stands the clinic for the smaller domestic animals, comprising operating room, sections for dogs, cats, rabbits and poultry.

V.—THE SHOEING FORGE.—This is planned to be comparatively large, as it shall also serve as a place of instruction for civil and military farriers; since it has been contemplated to arrange courses in farriery, which we expect will be largely attended.

VI.—THE POST-MORTEM ROOM.—Here all necropsies will be performed and practical instruction in pathological anatomy will be given.

VII.—A small building for maceration of anatomical preparations.

VIII.—The Veterinary Institute's main building is to afford accommodation for instruction in bacteriology and serology, with inspection of foodstuffs and instruction in veterinary jurisprudence and hygiene. It will likewise contain the College Library. In this connection a number of alterations and new fittings will be required.

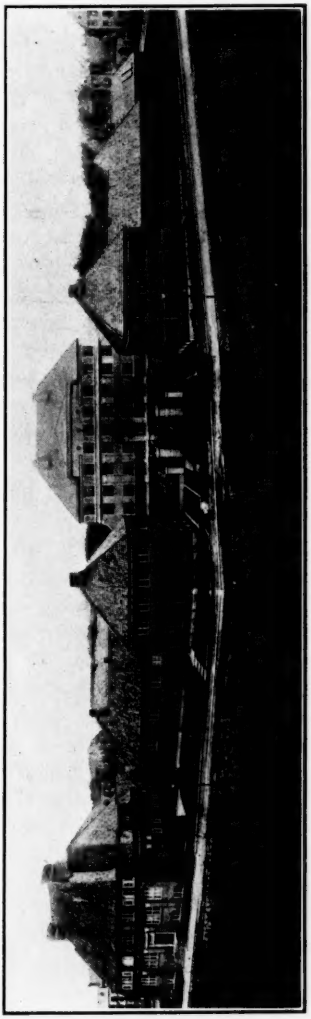


Fig. 1. Front View of the Norwegian Veterinary College, The Veterinary Institute, The Medical Clinic, The Main Building, The Surgical Clinic.

In the buildings mentioned space is assigned for family dwellings for eight janitors and attendants, as well as four bachelor flats for the resident house surgeons and assistants, and on the site there is an older building which it is intended to equip as residences for two of the professors of the College and for two assistants.

To begin with, it is intended to admit only 10 or 12 students annually to the Veterinary College, but there is room for admission of double that number. The period of study is fixed at five years. The College will impart instruction only in veterinary subjects proper, whilst instruction in the auxiliary subjects is relegated to Oslo University, so that the students of the College will take part in the courses for medical students where this is suitable, or else will receive special instruction in those subjects for which such an arrangement is necessary. The subjects assigned to the University are physics, chemistry, botany, zoology, pharmacology and pharmacy, as well as physiology. The lectures on bacteriology and serology will be given by the Director of the Veterinary Institute.

Arrangements have already been come to with the University on this point. The professors concerned are to have special remuneration for this instruction.

Practical training in meat inspection will be obtained at Oslo Municipal Abattoir.

By this arrangement the equipment of costly laboratories is avoided and fully satisfactory instruction will be secured, which at the same time will be exceedingly cheap.

For the veterinary subjects proper the following staff will accordingly be required :—

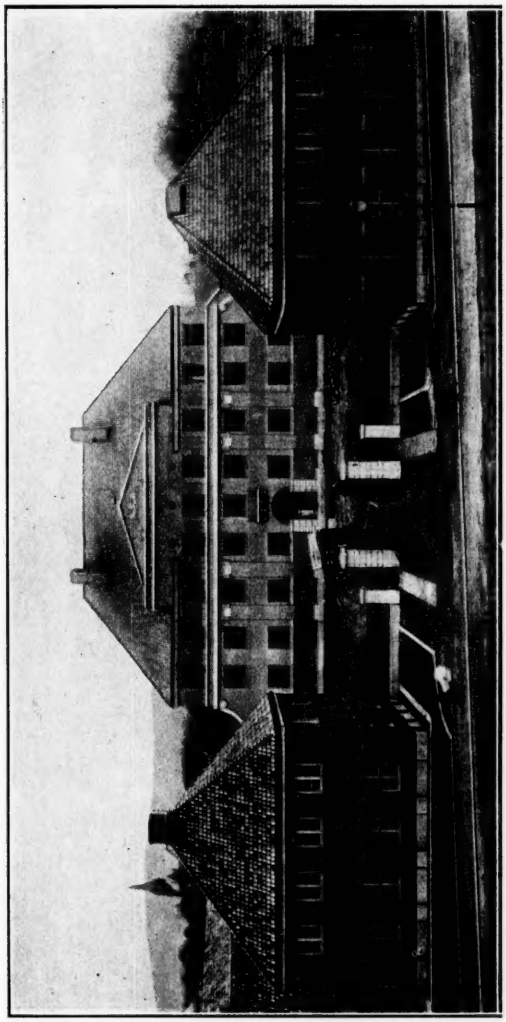
1.—Anatomy. One professor with an assistant, who will be entitled " prosector." For this section also one attendant, who will attend to the preparation of the subjects.

2.—General Management and Manipulation of Animals. One professor, one attendant, who will also help those assistant teachers who give their lectures at the College.

3.—General Pathology and Pathological Anatomy. One professor with an assistant, entitled " prosector," one attendant, acting also as preparator.

4.—Special Veterinary Medicine. One professor, who will also be chief of the medical clinic and of the clinic for small domestic animals, one assistant. For the clinics, two attendants and as many men to look after the animals as may be required.

5.—Surgery. One professor, who will also be chief of the surgical clinic, will lecture on farriery and superintend the shoeing smithy, one assistant. For the clinic, one attendant and the necessary number



THE NORWEGIAN VETERINARY COLLEGE.

Fig. 2. The Medical Clinic, The Main Building, The Surgical Clinic.

of men to look after the animals. For the smithy a permanent master smith and assistant smiths as required.

6.—Obstetric Clinic and Ambulatory Clinic to the country, etc. One professor, one assistant and one attendant (driver).

7.—Inspection of Meat, Milk, Fish, etc., Veterinary Jurisprudence and Hygiene. One professor.

The office staff will consist of one cashier and secretary and one assistant clerk.

The central-heating plant. One skilled machinist, who at the same time will act as janitor and caretaker for the whole college.

The task of the Veterinary College is to afford instruction on a scientific basis for education of veterinarians, to hold examinations and to promote scientific research in all fields of veterinary medicine. The College may furthermore, at the suggestion of the professorial council and with the approval of the Department of Agriculture, arrange practical courses.

THE NORWEGIAN VETERINARY COLLEGE. Fig. 3. Side View of the Surgical Clinic.

ADMINISTRATION OF THE COLLEGE.—The College stands directly under the Department of Agriculture. The professors themselves elect a Rector for three years at a time, who is chairman of the professorial council and superintends the property of

the College and its activities. He shall take care that the work of instruction proceeds in good order and in accordance with rules and regulations and on the whole that everything proceeds according to the prescribed plan.

The curriculum of instruction :—

1.—Physics. For students who have taken matriculation examination in science subjects no special examination is required. For others a course as prescribed for medical students.

2.—Botany. About 40 or 50 hours' instruction in the first term. The lectures will be given at the College by one of the teachers of the University.

3.—Zoology. Lectures at the College by one of the University's teachers. From 40 to 50 hours of instruction in the first term.

4.—Chemistry. The instruction is relegated entirely to the University.

5.—General Management and Manipulation of Animals. In the second term a practical course of instruction in care and treatment of livestock.

6.—Anatomy. Lectures during four terms on descriptive anatomy, topographical anatomy, histology and embryology, to which comes practice in dissections and evisceration.

7.—Physiology. Instruction relegated entirely to the University.

8.—Genetics, Zootechnics and Hygiene. The instruction embraces breeding of stock, science of feeding and care of health, as well as study of external conformation, etc.

9.—Farriery. Lectures and practical exercises.

10.—Pharmacology and Toxicology. Relegated to the University. Forty or fifty lectures, in addition to exercises in practical pharmacy.

11.—General Pathology. Embraces general pathological anatomy, general etiology and pathogeneses, as well as teratology.

12. Pathological Anatomy. Lectures, courses and demonstrations of sick animals, exercises in pathological histology and necropsies.

13.—Special Internal Pathology. The lectures embrace the internal diseases of animals.

14.—Surgery. Lectures in general and special surgery, as well as exercises in operations.

15.—Obstetrics. Lectures and practical exercises.

16.—Clinics. Instruction during six terms.

17.—Veterinary Jurisprudence. Lectures in the eighth and ninth term.

18.—Meat Inspection. Lectures and practical exercises.

19.—Milk Inspection. Lectures and practical exercises.

XUM

20.—Bacteriology. Lectures and exercises in general and special bacteriology.

21.—Serum and Vaccine Therapy. Lectures and demonstrations.

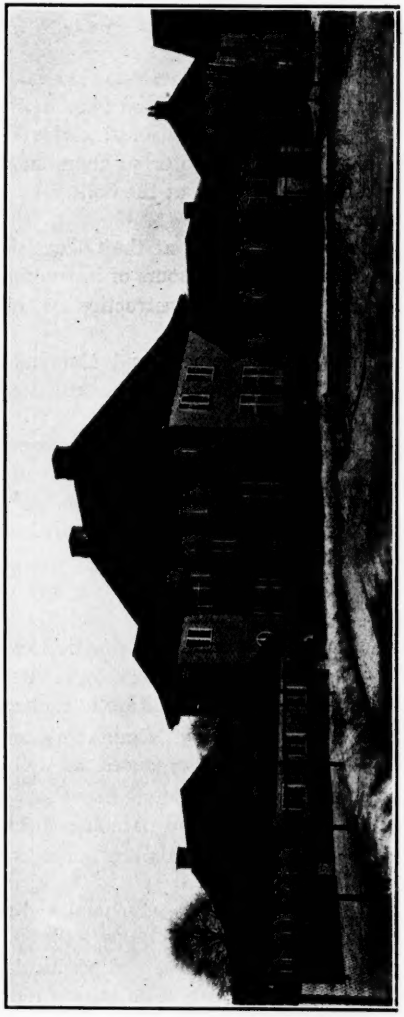
Instruction and Examination.

The instruction is imparted by means of lectures, demonstrations and practical courses.

It is intended to arrange the curriculum of studies into a first division of four terms, a second division of five terms and a third division of one term, covering a period altogether of five or five and a half years.

Working Budget.

The permanent teachers and other officials of the College are to be paid in all essentials at the same rates as functionaries in corresponding positions at the University, whilst the auxiliary teachers shall receive such fees as may be agreed upon for the instruction given. The planning committee in 1917 estimated the budget for salaries at kr. 92,050, but this amount will now probably have to be increased by about 40 per cent.



The Norwegian Veterinary College. Fig. 4. The Small Animals' Clinic.

The working expenses have been estimated at kr. 46,900, but owing to rise in prices this amount must now probably be doubled.

The receipts have been estimated at kr. 25,500, which can hardly be increased.

ON TRACING THE SOURCE OF TUBERCULOUS MILK.

By H. T. MATTHEWS. B.V.Sc. D.V.H., F.R.C.V.S.,
Veterinary Department, City of Liverpool.

THE task of discovering and dealing with the origin of tuberculous milk was, until recently, performed mainly by veterinary surgeons appointed by the towns in which such milk was being consumed. Since the change in legislation which delegated the responsibility to the Authority of the producing districts, many practitioners have had to tackle what was to them an unknown problem, with the natural result that standards of action and of efficiency vary markedly in different districts, even in the same county. In law it is the province of the medical officers of health to define the course of the investigation, but in practice they seem content to leave it to the veterinary surgeon. The object of this article is to discuss the scope of such veterinary inquiry and to name some of the difficulties which arise.

The greater number of these cases occur as a result of a bulk sample having been taken in the consuming district, usually a town. It is helpful to have some knowledge of the manner in which such samples are obtained for test. Ordinarily the sampling is done by a sanitary inspector at the destination of the milk, or it may be before actual arrival at the premises of the milk dealer, for example, at a railway station. In either case he is faced with a row of cans of many shapes and sizes, marked in a diversity of ways, coming from numerous districts. He has no infallible means of knowing what his sample involves. It may be from only half a dozen cows of a big herd, or it may represent the whole herd or many herds. Unless the can is sealed he cannot tell whether it is as it started from the farm or has been subjected to contamination en route. Statements as to its origin made, possibly in good faith, by the milk dealer, but in the absence of a dated sealed label, are of questionable value. Perhaps the can has never been sterilized in its life, and contains bacteria acquired many days before. And so on. After all, Ostertag showed that it was theoretically possible for the product of one tuberculous udder to be diluted with more than a whole day's supply for the entire country, and still infect a guinea-pig. So long as we recognise the possible

XUM

and, indeed, inevitable, errors of the bad system of bulk-sampling, we shall be better occupied in doing our part of the work properly, than in blaming others for anomalies that arise. Even guinea-pigs have been known to disagree among themselves as to the correct result of a sample.

The medical officer of the producing district must take, at its face value, the statement, by the medical officer of the consuming district, that a sample of milk taken on such a date, coming from such a farm, proved tuberculous. It may be the truth. It is an incomplete statement at best, and always late, in that there has been plenty of time for damage. If correct, in most cases it ought to be possible to trace the source of the infection, but not in all.

Some veterinary surgeons will begin the investigation by a clinical examination of the suspected cattle, having in mind only the fact that they are suspect. Others will like to interrogate the farmer first. Personally, I prefer the former method as giving more freedom for unbiased judgment.

The examination can properly be conducted at any time between morning milking and about noon, or after evening milking. Very few cows fill up with milk before noon so as seriously to interfere with palpation. It is important to have all the milking stock on the farm submitted, whether dry or not. There is a distinct advantage in being present during milking so as to see the standard of method employed.

While the examination is primarily directed towards the udders, a general view of each cow is desirable, and indeed is unavoidable. Condition, respiration and the wall in front, are the main points, in addition to palpation of each quarter and teat. The eyes should certainly assist the fingers in examination of the udder, and especially of the teats. The greater the skill, the greater the speed, up to a point.

If a case of tuberculous mastitis is found, probably the source of the original infection has been discovered, but it is not necessarily the only source. A sample of milk from the infected quarter, or quarters, is taken, direct into a sterile bottle, for subsequent confirmatory examination. It matters little whether it be fore-milk, middle or strippings. Bacteriologists like to have about six ounces for biological test. One ounce is enough for microscopic diagnosis. The remainder of the herd should certainly be controlled in one or more group samples, to make sure that no other early case has been missed.

But it is when no such definite culprit is detected that difficulty arises. Probably some degree of suspicion will be directed to one or more of the cows. Here the element of individual judgment enters

XUM

and must determine whether they are to be sampled separately, and if their milk is to be withdrawn from the supply. While approximate standardisation of system is both possible and desirable, it is not possible to standardise clinical skill. If there is reasonable doubt, the consumer must be considered first, but it is my experience that practitioners are inclined to err on the side of severity, and that many a cow's milk is stopped without due cause.

Not infrequently it happens that no cow can be singled out as the likely source of the trouble. In view of the numerous possibilities of infection other than direct from a cow, one is tempted to declare the herd clinically healthy and leave it at that. I am sure that such lack of decisive conclusion is wrong. In practically every case where a bulk sample has been found tuberculous, the suspected herd should be put to further test by control (or group) samples. Such samples are always taken in the confident hope that they will be returned negative, and so free the herd from suspicion. Sometimes, of course, the hope is not realised, in which case one has at least narrowed the field of later inquiry. The guinea-pig, with all his faults, is more sensitive than is the most delicate clinical touch, and the best man will have disappointments at times. One or two streams of milk from each teat of each cow, form sufficient material for a control sample. If taken into a jug from the farm kitchen, it should be remembered that the jug has probably held milk before, and that washing is not sterilization. How many cows to include in one sample is a question that can only be determined by the particular circumstances of the case. It depends on the clinical findings, on the clinician's confidence in his judgment, on the size of the herd, the arrangement of cowsheds and so on. Probably it is seldom desirable to control more than 20 in one group.

Interrogation of the farmer is an essential part of the investigation. What cows have been sold off since the original sample was taken? Why? Unless some special reason exists, it is hyper-efficient to trace these to their destination. Have any died? How many have gone dry, and how many calved? And, particularly as the farmer has had notice of the pending examination, what is in the loose-box in the stack-yard, or out in the pasture farthest from the road? Delicate questions, these. Does any neighbour's milk go in with his? Does anybody else use his cooler? Does he get his own cans back regularly? Are they ever, to his knowledge, sterilized?

Possible causes of the original infection, but difficult of proof, are numerous. Fæcal contamination, from dirty cows in dark cowsheds, is probably a fruitful source, in view of the enormous incidence of the disease among dairy herds. Mud dropped into the milk is likely to have

XUM

been derived from a picturesque pond, into which all the tuberculous cattle of the farm have defæcated from time immemorial. One is sometimes forced to think that a cow has excreted bacilli in the milk, for a period long enough to infect a bulk sample and a control sample, and has then ceased to do so. The Americans place some significance on skin lesions of the legs, udder and teats, which may heal. Farm cats have a habit of gazing into milking pails left on the ground, and are not uncommonly tuberculous. Dogs, poultry, even flies off the dung-heap, may have done the damage. The clinician who fails to preach sanitation on these occasions is missing an opportunity, as is the medical officer who fails to send his sanitary inspector.

The health of the milkers is a matter for the doctor, but as he seldom attends, a note in the formal report to him of any suggestive feature observed, may not be trespassing unduly.

There will be cases in which no definite cause is discoverable, even when all the original cattle are still available for examination. But for practical purposes the veterinary surgeon has done his job if he can show, by complete control samples, that at the time of his visit the milk was not capable of infecting a guinea-pig. A man, holding a part-time appointment, who includes in his report a record of the construction of cowsheds, drainage, water supply and so on, is exceeding the duties for which he is paid, but he certainly should indicate any prominent mistakes in general hygiene. A printed form, something like the following, would probably cover most eventualities and save an amount of unnecessary verbiage.

MILK AND DAIRIES (CONSOLIDATION) ACT, 1915.

VETERINARY REPORT TO M.O.H.

FARM..... MILEAGE.....

DATE OF VISIT.....

BULK SAMPLE TAKEN AT.....ON.....RETURNED T.B.....

PRESENT MILKING HERD 39 *in milk*, 4 *dry*. *All examined.*

CHANGES ... ... 2 *sold beef*, 1 *gone dry*, 2 *calved*, 1 *newly purchased.*

CLINICAL NOTES AND SAMPLES TAKEN ... *The herd consists mainly of young cattle in fair condition.*

Sample No. 1. *Aged red cow, white face, cock horns, standing second from door of long shed. L.H. quarter enlarged, indurated. No history. Micro. positive.*

Sample No. 2. Control. 16 in long shed (excluding red cow and 2 dry).
,, No. 3. Control. 11 on house side of double shed.
,, No. 4. Control. 10 on far side of double shed (excluding 2 dry and blue poll cow with acute mastitis).

REMARKS ... ... *I am dealing with the red cow (Sample 1) under the T.B. Order forthwith.*
The milk of the blue poll cow is withdrawn pending recovery.
Samples 2, 3 and 4 are submitted for guinea-pig test. The cattle are dirty.

Signed ..... R.C.V.S.

SECTION OF COMPARATIVE MEDICINE.

President—Sir D'ARCY POWER, K.B.E., F.R.C.S.

(March 28th, 1928.)

Intradermic Tuberculin Testing in Cattle.*

By T. DALLING, J. H. MASON and W. S. GORDON.

Proceedings of the Royal Society of Medicine, July, 1928.

WE have carried out many tests in cattle, using concentrated tuberculin intradermically, and some of the points investigated have already been published.

Two herds of milch cows have been under our observation for the past three years, and, using the double intradermic tuberculin test twice a year, we have succeeded in separating reactors from non-reactors and in keeping the non-reactor sections tubercle free. Farm A had 103 milk cows and heifers, and when tested in 1925, 67 reacted positively and 36 gave a negative result. From the non-reacting cows 6 were chosen for the supplying of milk for calf-rearing and removed to a special calf-rearing farm; 31 of the best cows were removed to a new farm. These cattle have been tested twice annually for the last

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two and a half years, and those remaining in the herds are still non-reactors. It has been necessary to add to these herds ; double intradermic testing has always been carried out on these additions before their admission to the herds.

Farm B had 96 milk cows and heifers. Three years ago application of the double intradermic test showed that 58 were affected with tuberculosis.

The 38 non-reactors were dealt with as on Farm A, except that for one and a half years they were kept on the same farm as the reactors but in separate sheds. An occasional reactor was detected in subsequent tests, but one and a half years ago the owner took over a new farm to which the non-reacting cattle were sent ; since that time no further reactors have been noted. Additions to the herd are dealt with as on Farm A. Subcutaneous tests have also been done on two occasions and the results agree with the double intradermic tests.

Calf-rearing on these two farms has been under our observation for three years. The farmer, unfortunately, insists that the calves suck their dams once ; they are then removed to the farms on which the non-reacting cattle are kept and are fed on milk from these cows. Intradermic tuberculin tests have been carried out on these calves at regular intervals, and of over 100 calves so reared only two have shown reactions, while the majority of control calves kept on the original farms and fed on milk from the reacting cows have reacted at some stage in their lives to the tuberculin tests. It is then evident that the double intradermic test is a satisfactory test to employ in the cleaning up of a herd and in the testing of cows supplying milk for the feeding of calves on a presumably clean farm.

In addition to the cleaning up of herds we have studied the reactions produced by the double intradermic method of testing on other cattle, and it may be of interest to note the following :—

(*a*) *Standardisation of Tuberculin.*—The tuberculin used for the tests has been standardised by the intradermic guinea-pig method, and we are convinced that a tuberculin so standardised and passed as equal to the Frankfurt standard, is an efficient preparation for intradermic use in cattle.

Tuberculous cattle will not show the same degree or type of reaction in every case with the same tuberculin, in fact, similar amounts of the same tuberculin, injected into different parts of the skin of the same animal, produce different reactions, but experience in reading reactions will cause one to classify different degrees and types of reaction as positive.

(*b*) *Strength of Tuberculin.*—While most of our tests have been made with tuberculin equal in potency to the Frankfurt standard, lately we have used tuberculin of double and even quadruple strength. In our experience a cleaner cut reaction is obtained by such a preparation. We have had the feeling that a strong tuberculin while giving clearer positive reactions, produced some degree of non-specific reaction even in non-reacting cattle, and that the more marked reaction in tuberculous cattle was due to this non-specific reaction. Our numerous tests, however, convince us that, allowing for an increase in non-specific reaction, a strong tuberculin gives a more definite and more easily read positive reaction than one of standard potency. In all our experience there have been only four cattle in which a very marked degree of difference in reaction has occurred when a standard and a fourfold strong tuberculin were used, and it is very probable that, using tuberculin equal to standard, these cows would have been passed as non-reactors. We believe that the benefit derived from the use of this strong tuberculin is that there will be fewer indefinite reactions recorded. Indefinite reactions do occur, and some cattle will continue to show such indefinite reactions at all tests no matter how often applied. With the use of strong tuberculin these indefinite reactions are reduced in number, but are still observed. It may be that when purified tuberculin has been thoroughly worked out and is available for general work the " indefinite reaction " will be further reduced or will disappear entirely.

(*c*) *Comparison of Subcutaneous and Intradermic Tests.*—We have tested many cows and heifers by both methods, usually leaving an interval of about one month between the two tests, and as a rule the results are in very close agreement. We have, however, records of the testing of cattle in which exactly opposite results have been recorded. In one cow only have we observed that positive reactions were obtained by the use of tuberculin subcutaneously, while the intradermic tests were negative. This cow was tested on many occasions, and never once did she react to the intradermic tests, while on every occasion a typical temperature chart followed the use of diluted tuberculin subcutaneously. This cow died, and *post-mortem* examination showed advanced generalized tuberculosis, which was confirmed by guinea-pig inoculation.

In five cows only are we able to record the reverse, viz., they reacted to the intradermic test while subcutaneous tuberculin gave no reaction. These cows were tested intradermically, and a month later received a dose of tuberculin subcutaneously. They reacted typically to the first test, but gave an entirely negative reaction to the second test.

XUM

In six months' time they were again tested by both methods, one month elapsing between the tests, and the results were as before. These cows are now isolated and will be subjected to further testing in the near future. It should be noted that a double dose of tuberculin was used for the subcutaneous test and temperatures were taken every three hours after injection.

Cases of similar results are recorded in the literature, but after a series of over 300 tests by both methods these five cows are the only ones which in our hands have yielded such results.

The conclusion one would draw from the large series of tests we have carried out is that the double intradermic method of tuberculin testing is reliable, and the amount of error is probably somewhat smaller than when the subcutaneous method is used.

Discussion.—Dr. Leslie Sheather asked how the quadruple strength concentrated tuberculin was prepared.

Dr. F. C. Minett asked whether, in Mr. Dalling's experience with the double intradermal test, it had not been observed that young tuberculous bovines reacted more intensely than older ones.

Major-General Sir John Moore asked Mr. Dalling whether, in view of the fact that the standardised tuberculin gave no reaction and the tuberculin of quadruple strength did, he considered the former tuberculin was perfectly standardised or not.

Mr. George W. Dunkin: Mr. Dalling has stated that when cows which had reacted to the double intradermal tuberculin test give birth to calves, these calves were permitted to suck their dams once only and were then removed to tubercle-free premises. Was it to be assumed, therefore, that the colostrum of tubercular cows did not contain the tubercle bacillus?

Major Dalling (in reply) said that in his experience the degree of reaction among young tuberculous bovines was neither greater nor less than that observed among older animals. The standard tuberculins used for comparative tests had been standardised on guinea-pigs and cattle very many times. He was well aware that the colostrum of tuberculous cows might contain tubercle bacilli, but, unfortunately, to meet with the owners' wishes the risk of young calves being infected with tubercle from such colostrum had to be taken. He could not, off-hand, give the contents of the medium used for the production of quadruple strength tuberculin.

XUM

MILK BOTTLES AS A POSSIBLE CAUSE OF EPIDEMICS.*

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AND
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THAT diseases can be, and are, spread by milk is common knowledge.

As far back as 1878 Power adduced evidence that an outbreak of diphtheria in Kilburn and St. John's Wood, London, was spread by milk.

Trask summarised 51 outbreaks of diphtheria spread by milk, but found it impossible to locate the source of infection in a number of the outbreaks.

In his book, "Milk and Public Health," published in 1912, Savage gives, on the whole, about the most comprehensive description and explanation of the subject. In summarising the epidemics which have been regarded as being due to milk in this country, he says, "Out of 19 epidemics investigated, the source of infection, although most certainly due to milk, could not be precisely traced, but the remainder of the epidemics were traceable in most cases quite definitely to a diseased cow!" Of known cases he quotes 10 epidemics, leaving 9 unaccounted for.

In 1908 Trask compiled a list of 317 outbreaks of typhoid fever and a large number of scarlet fever cases spread through milk. He classifies these cases under four headings:

(1) Recognised causes; (2) Unrecognised causes; (3) Through infection of vessels, bottles, etc.; (4) Specially infected cows.

From these earlier dates up to the present day one could, we imagine, quote cases almost *ad infinitum*.

We know that milk is handled very differently now from what it was 20 years ago. Regulations are very different and new laws have been instituted. We suppose that most of us remember when the only prosecutions which were possible regarding the sale of milk were when the vendor was caught mistaking a pump for a cow. Now authorities have much more power over the distribution of milk to

* A paper read before the Congress of the Royal Institute of Public Health at Dublin (August, 1927).

the public. With all the improvements in milk distribution (and we admit there are many), in our opinion there are more needed, and urgently needed, for that matter. Some may think we are making much of a trivial matter, but we do not look upon it as such; be it trivial or otherwise, it should not be overlooked. Many so-called trifles are often overlooked, or not given sufficient attention. It is frequently a tiny spark that causes the conflagration. It is the province of the hygienist to prevent disease, and it must be within that province to bring every matter, whether great or small, to notice with that one end in view. It is no argument against an assertion of what may happen, to say that such a happening has not been recorded if there is the smallest possibility of such an event taking place, especially when it has reference to the spread of disease.

Fig. 1. The faulty, creviced top and bottom of the milk bottle at present in common use.

From the few facts we have quoted it is quite evident that it is possible to spread disease by imperfectly cleaned milk vessels. It is not only possible, but highly probable that a good many cases in which the source of the trouble has not been definitely traced, may have arisen in this way. As a further proof of what is possible, we have made a simple test relative to bottle washing as it is frequently carried out by small distributors. We are indebted to Dr. Rawlinson, of the Royal Institute of Public Health, for the following details:—

"A quart bottle of milk was infected with 5 c.c. of broth culture of *B. Typhosus*. The bottle of milk was then arranged with four other bottles of milk. All the bottles were emptied and the bottles rinsed and filled with cold tap-water and left standing for a quarter of an hour. They were then emptied and all washed together in a vessel containing clean cold tap-water. Fresh milk was then added to each and they were allowed to stand at room temperature overnight.

"20 c.c. from each bottle was centrifuged and the deposit examined by culture for *B. Typhosus*. An organism giving the same agglutination reaction as the original organism was recovered from two of the bottles, one of which was the infected bottle."

We appreciate that large distributors have special bottle-cleaning machinery and send out their bottles in a perfectly clean and sterile condition. But what about the small distributor who has, from force of circumstances, to clean his bottles by hand. It is practically im-

possible for a small trader to be sure of immunity against trouble caused by imperfectly-cleaned bottles. The cost of labour to secure such immunity would be prohibitive. Hundreds of small traders do nothing more than wash their bottles in a similar way to that which ours were washed in the test mentioned.

It comes to this: Is the system of milk distribution by bottles a desirable one? *We contend that the system as at present generally adopted—namely, by means of a disc-capped bottle—is a very bad one from every point of view.* The advantages of the system have taken a firm hold on the public mind, and the propaganda issued by retailers in favour of it (can we say entirely *pro bono publico?*) may make it somewhat difficult to relax that hold. What are the advantages? Closed bottles inevitably suggest cleanliness and safety, and short measure, being detectable at a glance, has become a thing of the past. Disadvantages have barely occurred to the general public, and yet we say they are many and formidable, and they far outweigh the advantages. *It surely demands but little reflection to see that the bottle in commonest use is a thoroughly unhygienic vessel for its purpose. The narrowness of the neck makes it difficult to clean; the groove round the bottom inside edge, occasioned by the convexity of the base, is a more serious objection and still worse is the shape of the neck and method of capping.*

No matter what care is taken and no matter how well the bottle is sent out from the distributing depot, *a rim disc-capped bottle is liable to a hundred and one contaminations by the time it is opened for use.* The hollow at the top of the neck of a one-pint rim disc-capped bottle is about $1\frac{5}{8}$ in. in diameter and $\frac{1}{8}$ in. deep. A considerable amount of infection not only can, but does, collect on the disc and, apart from the fact that many of the cappings allow of a small leakage, when the bottle is opened a good deal of the accumulation goes into the milk. *The dust which accumulates when these bottles are left at street doors, in areas, and on the stairways of flats, is obvious.* Any day one may see milk being left at a house at the same time that the dust is being collected, and almost any day one can see bottles contaminated by dogs. Many people have become so satisfied with the feeling of security regarding their milk that they do not think of these things, and will leave bottles of milk standing about on floors and landings for hours. We have already mentioned the question of cleaning bottles. A short time ago one of us visited a small dairy where the cleansing was done by hand. What did we find? Cold water only on the premises, and any hot water used was carried in a pail from a house about 100 yards away. An inspection of some of the bottles ready for refilling, confirmed our suspicions. The bottom edge of the

inside of some contained quantities of congealed milk. Let us appreciate how infectious diseases may be spread in this way. Empty bottles may be collected from an infectious house, rinsed, refilled and sold again. Retailers take these bottle round on a nice-looking hand-barrow glittering with polished brass and with every outward sign of perfectly protected milk. Moreover, many of the roundsmen are quite willing to oblige casual customers with a bottle of milk filled just round the corner, the milk from a supply-can carried in his barrow, the bottle, a clean-looking empty, collected on the round and capped with a disc from his pocket.

The great majority of people are now receiving milk which is far more liable to contamination than it was by the old method. Many people never dream of rinsing out a milk bottle, taking it for granted that they will get a clean one every time they buy milk. Some of them not only never rinse them, but they deposit them anywhere; sometimes on the rubbish-heap, in a filthy back-yard where they get filthy matter inside the bottle as well as out. Such people would not throw their empty milk-jugs on the rubbish-heap, and would therefore be much safer from infection if they were responsible for keeping their own milk vessels clean; and so would their neighbours! Milk cans were said to be difficult to clean; but bottles, unless done in elaborate machines, are much more so.

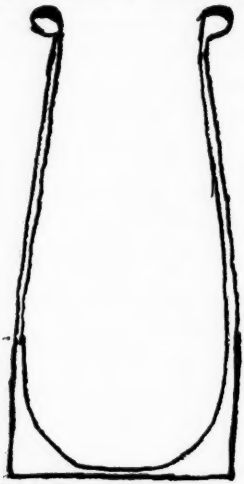

Fig. 2. Shape of bottle showing top which allows dust-proof capping: and which has a rounded interior bottom which can be readily sterilized.

What remedies can be suggested?

1. Authorities should be given power to condemn unsuitable storage and delivery vessels.

2. A destructible container for retail delivery would do away with bottle-cleaning difficulties.

3. If bottles are used at all, they should be of a standard shape, something on these lines:—

4. All bottles or containers should be capped in such a way as to make it easy to remove the cap without any dirt entering the bottle.

Such innovations would certainly be a step in the right direction. What objections could be raised? Exception might be taken to further legislation in the matter by some people, but legislation, as it applies to milk distribution, is not at all too severe at present.

When one talks of a destructible container, the question of cost

is at once raised, but against that can be reckoned the cost of bottle breakages and cleaning, which must be considerable. No doubt there are difficulties in the way of establishing this method, but surely they could be overcome. The destructible container would prove a great boon to the small retailer. To do away with all the disc-capped bottles and insist upon a standard bottle would only affect the big firms, and small retailers would benefit rather than otherwise; for when further legislation is suggested, one must give a thought to the general effect on the industry. We quite expect some adverse criticism from large distributors, who will say, what we willingly admit, that they take every care and send out their bottles in a perfectly satisfactory condition. They may say, why should they be asked to do away with valuable machinery and material because the small retailer falls short of doing his business in the most satisfactory way? Whatever they say, we feel confident that they cannot support a case in favour of the present rim disc-capped bottle. It is the duty of those in charge of the public health not to let any pecuniary interests of large distributors stand in the way of the abolition of any method of distribution which either does, or is likely to, jeopardise the health of the community.

OBSERVATIONS ON CALCIUM DEFICIENCY AS A CAUSE OF CERTAIN DISEASES OF ANIMALS AND MAN.*

By C. E. CORLETTE, M.D., Ch.M., D.P.H.,

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(*Continued.*)

Weill & Mouriquand's Experiments on Pigeons.

An extremely interesting paper was published in 1918 by Weill and Mouriquand[33] on what they called "*Syndrome béribérique expérimental chronique.*" Whereas avian polyneuritis of the type induced by polished rice comes on between the twentieth and fortieth day, Weill and Mouriquand, experimenting with pigeons, describe as chronic beri beri a paralysis that did not appear, on their dietary, until many months, sometimes over a year, had elapsed. *Post-mortem* examination showed serious lesions (osteoporosis) in the bones. They say "these chronic beri beri symptoms exhibit a complete resistance to medication by raw cortical substance," this substance having been

* Reprinted from "*The Medical Journal of Australia.*" Feb. 18/28.

XUM

found specific by themselves and others in what they call the acute type. They explained the resistance as due to the fact that in the chronic type an actual nerve lesion had developed, whereas in the acute it was functional. To them it was still a beri beri paralysis. I think they guessed wrong. When one examines the dietary on which this " chronic type " was induced, one finds that it consisted of equal parts of uncooked whole rice, sterilized whole barley, and sterilized whole wheat. This is a dietary extremely low in calcium.

I would say that these cases of avian paralysis resistant to treatment by cortical substance were homologous with *lamziekte*, not beri beri. Like these pigeons, the Armoedsvlakte cattle were also resistant to treatment by cortical substance (orypan).

E. Mellanby's Researches on Rickets in Puppies.

Mellanby[2] mentions that nervous symptoms were common in puppies eating his deficient, rickets-producing diets. He classifies them into three groups. In the first, the animals cannot run straight, they may run round and round in a circle, or they seem intoxicated, swaying and falling. In the second group there is paralysis, especially of the hind legs. In the third group the nervous disturbances consisted of tetany and convulsions.

Similar symptoms are described in *lamziekte*, and I suggest that the paralysis and other forms of nerve disturbance seen in these puppies was due to the same essential cause, and homologous with *lamziekte*.

Paralysis in Monkeys and Lions in Zoological Gardens.

As long ago as 1884, Bland Sutton[34] [35] [36] described as rickets and osteomalacia a disease occurring in monkeys and lions at the London Zoological Gardens. The chief symptoms during life were paraplegia and other nervous disorders, and *post-mortem* examination revealed great softening of the bones, and pathological changes in the spinal cords of the animals. In more recent years, Campbell and Cleland[37] have described as " cage paralysis " what is obviously the same disease in monkeys and lions at the Sydney Zoological Gardens, though they did not describe the condition of the bones. Campbell and Cleland found that a monkey would improve rapidly on a diet of wheat, maize, and green lucerne. I may remark that green lucerne (alfalfa) provides a foodstuff rich in calcium and rich in vitamin *D*.

As to the reason why caged lions should develop rickets or osteomalacia, I would suggest that it is due to the deprivation of sunlight and of vitamin *D*. The animals are fed on the flesh of worn-out city horses, not animals fed on vitamin-rich fresh grass, but on chaff and

bran, and whose meat, therefore, even if fat, would be as poor in vitamin *D* as pig fat has been shown to be by Drummond and associates,[38] except when the pigs have been fed on fresh green food. These carnivora, therefore, are placed under exactly the same sort of conditions as Steenbock and Hart's goat,[1] referred to at the beginning of this paper, and they may be expected to develop the same persistently negative calcium balance as was found to exist in the goat so long as it was deprived of sunlight and vitamin *D*. They would suffer from a calcium diabetes.

Phenomena Occurring in Connection with Lactation.

Milk Fever of Cows; Lactational Dyspepsia.

Paralysis and other nervous phenomena coming on after parturition have been noted in many domestic animals. It occurs sometimes in swine. But the phenomena are most severe and most common in dairy cows, and among these, most frequently in those strains which are the heaviest milkers. Apparently it occurs occasionally in cows before parturition; an *ante partum* paralysis has been described also in ewes carrying twin lambs by Gilruth.[3] There is more or less variation in the symptoms, but there is, on the whole, a very striking similarity to those of *lamziekte*. In cows, the acuter manifestations have been termed "milk fever" (though there is not necessarily, or even commonly, a rise of temperature), "parturition paresis," "milk collapse," and so on. In this form, the symptoms come on usually within the first week after parturition, but may be delayed to the fourteenth day. We may compare with this the statement that cows in milk generally go down with *lamziekte* eight to fourteen days after calving. There is a later condition described in textbooks as "lactational dyspepsia," or "chronic gastro-intestinal catarrh after calving," which is associated with nervous symptoms of a less acute kind, but which by their description seems to be essentially of the same general type, and probably of the same pathological significance, since the same very specialised treatment benefits it.

The onset of milk fever is sudden, with signs of discomfort and obvious illness. The senses are dulled, the walk is unsteady and straddling, and typical of stringhalt, or the legs may sway and cross each other, and they soon give way. The animal comes to the ground, where it lies in a drowsy state with head resting on shoulder, flank or ground. Occasionally there is excitement or disordered movements, with cramps, and flexion and extension of the limbs. Apparently at first there is not true paralysis, but spasticity. In favourable cases, after from one to four days the animal may get up and resume feeding, the suddenness of the improvement being as marked as the

XUM

suddenness of the attack. Some, however, are restored to intelligence and appetite while the hind limbs remain paralytic or paretic for days or even weeks. In other cases there may be signs of paralysis of the soft palate and larynx, and swallowing is impossible, the somnolence increases, the corneal reflex disappears, and the animal dies comatose. According to Law,[40] the death rate in untreated cases is as high as 70 per cent.

In lactational dyspepsia there is dullness, diminished appetite, imperfect rumination, constipation, diminution of the flow of milk, and staring coat. In recently calved animals the body seems permeated with a sickly odour, the milk while warm carrying the odour intensely. Nervous phenomena usually increase, dullness becomes more marked, and the animal staggers if made to move. In other cases the animal which has for a few days seemed out of sorts, begins to " paddle " with the hind limbs, and walks with a spastic stringhalt gait. Licking of the walls may be [illegible]d. The animal may fall in a convulsive spasm and remain down, suffering from recurring convulsions. Later on the body may remain in a sort of permanent tetanic spasm. In other cases the animal is simply unable to get up. Cerebral excitement often replaces torpidity. Death may be from exhaustion, suffocation, or inanition. It is remarkable that the standard textbooks on veterinary medicine (Hutyra and Marek, Hoare), state that tetany is practically unknown in domestic animals; nevertheless, I am bold enough to assert that what is described in these animals is tetany. It is worthy of very special remark that this lactational or *post partum* dyspepsia is said by Begg[41] to be most frequent in artificially fed cows, and to be practically absent when they are at grass.

In recent times a very successful empirical treatment of [illegible] fever has been introduced. It is known as Ever's modification of Schmidt's treatment, and it consists in passing a cannula up through the orifice of the teat, and pumping air into each one until the udder is tightly distended. It is left in that distended condition, the operation being repeated if required. The almost invariable result of the treatment is that in two or three hours the cow gets on her feet, the bowels move freely, urine is discharged, and water and food are taken (Law[42]). The same treatment is said to be beneficial in lactational dyspepsia (Hoare[43]).

In the absence of any reasonable explanation of the almost miraculous effect produced by this remarkable treatment, I have set about finding one. I believe I have succeeded, but it fails to be a solution if my hypothesis as to the cause of the symptoms is incorrect. Upon making inquiries from men with practical experience in the treatment, I found what I expected to find, that the distension caused a sudden

and relatively enormous reduction in the quantity of milk secreted. My conjecture is that milk fever, or milk collapse, is due to a denudation of the readily mobilisable calcium, or calcium and phosphorus, though it is less likely to be the latter, since there is probably more readily mobilisable phosphorus than calcium in the tissues. This denudation is the result of a sudden surge of the calcium towards the milk glands, and is a " surprise " effect. There has been an unusual run on the calcium bank, or calcium phosphate bank, in the bones, and the osteoclasts, the paying-out staff, have been for the time being, unequal to the demand. Hence the breakdown. A temporary reduction in the milk flow gives time for readjustment of supply to demand by reducing the outgo of calcium phosphate.

The so-called lactational dyspepsia which does not occur in cows at grass might be well accounted for by deficiency of vitamin *D* in stabled cows on dry fodder, and especially easily if it is a low-calcium fodder, such as oats grown in an acid soil. This would reproduce in the cow exactly the same conditions as in Steenbock and Hart's goat,[1] already referred to, and it would accordingly induce a persistent negative calcium balance,—calcium diabetes,—whether she were lactating or not.

I suggest that temporary recovery from the symptoms of milk fever and lactational dyspepsia would be obtained by intravenous injection of 200 mils of two per cent. sterilized solution of calcium chloride, or alternatively, by intramuscular injection of parathyroid extract prepared by Professor Collip's method. The first would add calcium to the circulation for a few hours, the second would mobilise calcium phosphate from the bones.

The efficiency of the paying-out staff in the calcium bank in the bones is affected in some way by the activity of the parathyroid glands, and the activity of the parathyroids seems to depend on the presence of vitamin *D*. At least, that is the way I have come to look at it after some years of close study, but I cannot discuss that further here.

Epizootic Stringhalt.

I am acquainted with a district in New South Wales where the farm animals have from time to time been liable to show various morbid conditions. For instance, slow growth, lameness, stiffness, inco-ordination, various rheumatoid affections, gastro-intestinal catarrh with very foul-smelling fæces, coprophagia, geophagia, stiffness and paraplegia in pigs, and, in fowls, the laying of soft-shelled eggs. But I pass over these to refer to one special feature, described as stringhalt.

On one of the properties, the horses have, at times, for many years shown a propensity for eating the dirt of the paddock around their

XUM

watering place. These horses, like others in the district, exhibited a symptom known as stringhalt. I may add that the horses pastured on this place have been liable to develop stiffness in the legs and lameness for at least 35 years past. Also when driven in harness they had to be handled with great care, because on turning they were liable to fall over, with symptoms resembling vertigo. The soil on this place is of a highly acid type.

The kind of stringhalt here referred to assumes epizootic proportions in certain regions at times. It has been described from Victoria, New South Wales, and New Zealand, and its nature and cause have excited a good deal of speculation. A detailed clinical description of it was written many years ago by the late E. Stanley.[44] Stanley found the disease to occur on cold, wet soils and sour herbage. Reakes[45] has described the disease in New Zealand, and his article is illustrated with two photographs showing the action of the horse. I have seen a description of exactly similar symptoms from Nova Scotia by W. H. Pethick,[46] though it was not called stringhalt.

Now, I suggest that this stringhalt is a subtetanic condition homologous with what is known as spasmophilia in children. Further, it is due to calcium deficiency, and will be found to be associated with a hypocalcæmia.

Geophagia, "Sand Disease" of Horses, and Coprophagia.

Geophagia, or earth-eating, is manifested by many animals suffering from nutritional disorder. It is, for example, shown by animals deprived of common salt, and such animals seek out the most brackish soil. It is seen in children suffering from cœliac disease and allied conditions, diseases characterised by the occasional appearance of tetany as a symptom. Some of these children have an instinct sufficiently well-directed to choose mortar or other lime-rich material (Still).[47] A condition known as sand disease occurs in horses in many lands. These animals suffer from gastro-intestinal, nervous, and other symptoms, and sand is found in the intestine after death. Sand disease was a feature exhibited by the osteoporotic horses at Wynberg camp, referred to earlier in this paper. Where these morbid conditions most abound, the prevailing soil will very frequently be sand, and this may account for the kind of soil found in the animals. Grass or fodder grown on sand is fodder grown on a very acid soil, and would be poorly supplied with calcium. Therefore, unless animals can eat very large quantities (polyphagia), they are liable to suffer from calcium deficiency. When feed is scarce, there can be no polyphagia, so they will then be specially liable to show symptoms of deficiency disease.

There is, however, another resource. If the animals cannot get unlimited fodder, they can still get calcium phosphate by coprophagia, —and if it is any use to them, they can get lipoid and the fat-soluble vitamins from the same source,—just as they would from milk. On this view, coprophagia is due to a protective biological instinct. According to my information, coprophagia was widespread among army horses during the war. They were on dry feed—oats and grass hay—and appeared to maintain good health. Some would put that all to the credit of the officials rations. Considering the facts, such a conclusion would be illogical. If my view is correct, the coprophagia preserved the animals in the presence of an imperfect ration.

Liver Disease.

I may say that there is reason to believe that in calcium deficiency there are degenerative parenchymatous changes in the liver, in line with the state of epithelial tissues everywhere else in the body. Liver disease is constantly associated with nervous symptoms. These would be merged in the general complex of nerve symptoms in deficiency disease. I have referred to liver disease of this causation in an earlier paper,[48] and the subject is too large to pursue further here.

Some Cases of "Forage Poisoning" from a New Point of View.

An enzootic of horses and mules was recorded in 1915 from the Griffith farm, near Lexington, Kentucky, by Graham, Himmelberger, and Pontius,[49] which was considered to be forage poisoning. A number of horses died during a period of four months after exhibiting the following symptoms: dullness, partial paralysis of the pharynx, salivation, weakness and unsteady gait, and "various nervous manifestations," followed by prostration in a few hours. An animal once down was unable to rise unassisted. They observed the same symptoms on three other farms. Feeding experiments with the various feeds from these three farms gave negative results, but on the Griffith farm they reproduced the symptoms by feeding with oat hay from the farm. The oats appeared to be clean and good. We are not told what kind of soil the oats grew on, but it should be remarked that oats grow well on poor, peaty soils, that is, highly acid soils. This is the soil to produce oats with the lowest possible calcium content.

Next remark the clinical picture,—one bearing an extraordinary similarity to that of milk fever and of *lamziekte*.

Next let me quote from the authors, whose minds were occupied entirely with the toxic theory, the following:—

Feeding experiments with the various feeds from these farms resulted negatively. In such cases it is probable that only a limited amount of the

XUM

feed might contain the fatal material, or a marked tolerance to the same might prevail in some animals. The fact that some animals are markedly resistant is illustrated by one of our experimental horses. This animal was a hearty eater, and consumed approximately ten times the quantity of oats consumed by any one of the other experimental animals. In all experimental horses, with this one exception, the feeding of the oats terminated fatally.

Their explanation puts a strain on the probabilities. That the animal which ate ten times the quantity of a presumably toxic material should be the only one to escape, is too great a paradox. The reader should now refer back to my account of the Armoedsvlakte experiments, and he will there find comparable fatalities. To account for the recovery I offer my explanation of the protective value of polyphagia. I conclude that these farm horses died from deficiency of calcium phosphate, not from a food intoxication, and that the farm corresponded to what would in South Africa be called a *lamziekte* farm.

For previous References see pages 243-244. (*To be concluded.*)

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XUM

Clinical Articles

"Microfilariæ in Horses."

By MAJOR H. ALLEN, R.A.V.C.,
Remount Depot, Mona, Punjab, India.

A PERIODIC examination of blood smears conducted during December, 1927, and January, 1928, in connection with an outbreak of Surra in the above depot, revealed the existence of Microfilariæ in the case of nine mules and six horses. Subsequent to the cessation of the outbreak on February 14th, 1928, two horses were received in the Home Charge on March 22nd, 1928. The history of these two horses is as follows:—

HORSE NO. 1.—Admitted for catarrh, but otherwise in good condition. The temperature on admission was 101·2° F., but it subsequently ran a normal course except for an elevation of 101·2° F. on April 1st, and of 101·4° F. on April 3rd. Routine blood examination carried out morning and evening up to April 21st, 1928, revealed a single microfilaria on March 23rd, 26th and 31st.

HORSE No. 2.—Admitted as being "off his feed," condition fair to good. The temperature on admission was 103·4° F., and it dropped by lysis to normal on March 27th, 1928. No further elevation was noted except on April 5th and 8th, on which dates the temperature touched 102·4° F. A daily blood examination was carried out both morning and evening, until April 21st, 1928, and the number of microfilariæ found on the different dates were as follows:—

March 22nd, 1; March 26th, 2; March 28th, 1; March 30th, 1; April 1st, 5; April 3rd, 1; April 4th, 1; April 6th, 5; April 7th, 1; April 8th, 2; April 9th, 3; April 10th, 4; April 11th, 1; April 12th, 2; April 16th, 1; April 19th, 1; April 20th, 1; April 21st, 1.

The animal received intravenously an injection of 50 c.c. of a 10 per cent. solution of "Bayer 205" and three injections of a 1 per cent. solution of tartar emetic administered in doses of 50 c.c., 75 c.c., and 100 c.c. respectively, but the treatment appeared to have no effect on the microfilariæ.*

In neither animals were any untoward disease symptoms developed on account of the presence of microfilariæ in the circulating blood.†

The microfilariæ became disintegrated in about 6-8 hours in fresh cover-glass preparations. The following method of staining was adopted:—

Thick films of blood were dehæmoglobinised by being placed in

distilled water. They were then washed in clean water, allowed to dry, fixed in absolute alcohol and stained in carbol fuchsin. The microfilariæ were in all probability examples of the embryos of *Setaria equina* (Filaria papillosa), the common habitat of which is the peritoneum. Stained smears containing the microfilariæ were forwarded to the Director of the Imperial Institute of Veterinary Research, Muktesar, who very kindly had the following note made out on the identity of the parasites.

* It is of interest that Rogers (1919) in India recorded having obtained encouraging results in the treatment of 10 cases of filariasis (presumably all *F. Bancrofti*) by the intravenous injection of antimony. He found that the treatment brought about a "definite diminution of the number of filarial embryos in the peripheral blood." Macfie (1920), however, was unable to confirm Rogers's findings when he repeated the experiments in three cases of filariasis at Accra (due to *Microfilariæ perstans, Mf. Bancrofti and Loa loa*). In the course of a short review of the present position in regard to the chemotherapy of filariæis Nog (1923) states that he obtained encouraging results in the Mf. Bancrofti injection by the intramuscular injection of amino-arseno-phenol. The writer of the present paper proposes to give a trial to this drug in future cases of microfilariasis in the depot in his charge. Other arsenicals such as atoxyl and neosalvarsan, would appear to have proved entirely inefficacious in the treatment of equine microfilariasis.

† This would appear to be generally in accord with the observations recorded by various workers, although there are a few instances on record in which definite clinical symptoms have been associated with the occurrence of the parasites in the circulating blood. Thus, Boal (1920) in Gold Coast, considered that such infestation in horses is the cause of an intermittent fever, whilst, according to Vela (1921) microfilariasis is a contributing factor to the disease known as "fez" in Morocco. Zakimow and Collaboratas (1915) in Turkestan, noticed that a characteristic symptom of microfilariæ in horses was the presence of abrasions on the skin due to irritation, especially round nostrils, and the infected animals showed rapid exhaustion when put to work, the latter being also designated by Wirth (1917) as a most noticeable symptom in equine filariasis in Hungary.

A Renal Calculus.

By P. WELCH, M.R.C.V.S.,
Saffron Walden.

A BAY heavy-weight hunter gelding, nine years old, was noticed by the owner lame in front, but not always in the same leg. Sometimes the lameness would pass off, without treatment. At times he would be lame in both. On one occasion he was "stiff all over," as the owner called it. It was at this stage I was called in. This description was, to my way of thinking, pretty accurate. A brick-red coloured conjunctive was another symptom. It was my intention to start with a physic ball, but as this horse was particularly bad to handle about the head, he was given Aloin ℥ii in a hot mash, and exercised next day. As soon as the bowels were set Potas. Iodide, ℥ii doses, was given in the drinking water night and morning. There was a decided improvement for a time. This was now about the middle of February. Soon after this the intermittent lameness re-

turned, and as the season and the owner's patience were both wearing out, the horse was shot. On *post-mortem* a stone weighing half an ounce was found in the right kidney.

I confess I did not expect this, as I thought it was a case of rheumatism.

Non-Pathologic Sterility in Mares.

By J. BAASHUUS-JESSEN,

Veterinary Surgeon ; Live Stock Breeding Inspector, Oslo, Norway.

THE Norwegian State, also some of the large horse-breeding associations, are in possession of, or rents, pastures on the high mountain plateau, each of an extent of about 500 hectares and well isolated by natural boundaries. One stallion only, either a high-class prize-winner or a proved sire, is here turned out during the summer months with 40 to 50 selected mares, a few caretakers guarding them.

The observations on the fertility achieved are very remarkable, the percentage of fertility always being essentially higher in the mountains, where the horses are left to themselves, than at home on the farms under conditions less free. Fertility as a rule thus appears to be from 30 to 40 per cent. in favour of the services in the mountains. I have also observed under ordinary travelling conditions that several mares in succeeding years have proved unable to conceive, though they were mated " by hand " with absolutely recognised fertile stallions, but that, when the mares in question in other years were served two or three times a day until they went off heat, they became at once in foal. In two of these cases a decidedly bad foal-getter with a percentage of fertility of only 25 was used. Several of such " barren " mares I have observed, when once being got in foal by means of many repeated services with some ordinary stallion, have later on in succeeding years conceived easily from only a few services with more superior stallions for which, of course, a comparatively higher service fee had to be paid.

Stallions belonging to breeding associations are, as a rule, owing to various restrictions in respect to their use, much handicapped as compared with those belonging to private owners. Under these circumstances, especially because the number of services allotted to each mare in many cases, no doubt, are too small, I suppose that we have the reason why the latter stallions often excel the former ones as regards the percentage of fertility. Thus the Danish horse-breeding adviser, M. E. Aug. Kjær, has found that the percentage of fertility in stallions of the Jutish breed of draught horses and belonging to

XUM

private owners being 73·7 in average, whereas that of those belonging to the associations only being 68·6. As Kjær's statistics are based on a very large material, viz. of 170,082 served mares with 119,407 foals, a difference of no less than 5·1 per cent. is significant. In my opinion an analysis of the fertility in horse is not complete, if the investigators *inter alia* do not examine how many services a stallion has allotted to his individual mares in the breeding season. This supposition is corroborated by Houel (quoted by V. Prosch) who states that we, according to observations from the stud Pin, may reckon with, that out of 100 pregnant mares, 40 being conceived by the first service, 25 by the second, 15 by the third, 10 by the fourth and only five do conceive by a still greater or a more indefinite number of services.

In a great many cases the veterinary surgeon will not find the slightest sign of pathological symptoms in a mare which is unable to conceive, and if this is the case, many repeated services ought to be recommended the owner of such a mare. The problem of fertility in the horse, of course, does not only restrict itself to the principles described in this article, for it is, however, more complex. Other technical mistakes may be done than by giving a mare too few services, but in spite of this I venture to think that the latter cause is the chief thing. Thus there can be no doubt that a small degree of fertility in exceedingly many cases is due to the fact that the service takes place on a date which does not agree with the date of ovulation in the mare in her long period at heat, so that the spermatozoa wholly or in part have been attenuated, if they have not ceased to live at all at the latter most important juncture. From this we may infer that often repeated services during a definite period of heat must benefit an early conception. This theory proposed in 1925 by F. H. A. Marshall and John Hammond and confirmed in 1926 by the latter and S. A. Asdell in their experiments in rabbits is, in my opinion, the only one which covers the above-mentioned facts.

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Two Mares Treated with Morphinæ Hydrochloride in Cases of Sporadic Abortion.

By J. BAASHUUS-JESSEN,

Veterinary Surgeon; Live Stock Breeding Inspector, Oslo, Norway.

In February, 1913, when the present writer was a practitioner in one of the parishes of Hadeland—a well-known centre for horse-breeding in Norway—I was one evening called to see a pregnant mare, which, in the opinion of the experienced owner, was going to abort. Half an hour later I arrived at the place.

History.—The mare had that very evening been returned from some or other kind of forest work, but none of the ordinary traumatic impacts could in this case be pointed out as a special and highly probable cause. Infectious abortion was, in this case, quite out of the question.

Symptoms.—The mare, which at my arrival had been left to herself in a loose box, was agitated, lying down and getting up alternately as having abdominal pains. In order not to waste time, I omitted to observe the temperature. The respiration was somewhat increased, the pulse full and otherwise satisfactory. A bit of perspiration was to be seen, whereas no anxiety of the eye was noticeable. Apart from the two cardinal symptoms of abortion in mares, viz. a distended udder, containing fluid, and pains of labour, which now and then set in, nothing more abnormal was to be found.

Treatment.—Bearing the said cardinal symptoms in mind, I at once felt quite sure as to the correct diagnosis, that is why without further delay I gave the mare subcutaneously an injection of 12·5 grain morphinæ hydrochloride dissolved in distilled water. The height of the mare measured with tape-measure from the underside of the hoof to the highest point at the withers was, say, 157 centimetres. After a while the mare became quiet, lying down in an obviously comfortable manner and with a regular, somewhat deep respiration. Only a few attacks of uneasiness now and then set in, which quickly disappeared, and then the mare was left to herself after being covered with a horse-cloth.

Next day the owner rang me up, telling me that the mare in all respects was well, save that the udder was now more swollen and sore, for which reason he wanted to get it cured. This interesting fact is well worth notice, as it further confirms the correctness of the diagnosis—an undoubtedly true case of sporadic abortion.

Some months afterwards the owner informed me that the mare at term had dropped a foal, but unfortunately had not been watched, for which reason the foal had perished in the amniotic sac. However,

the fact remains that the abortion, at an early stage, when the described attack took place, had been arrested in its development by application of morphia hydrochloride, and this, of course, is the very gist of this interesting case, which I have formerly described in the "Norwegian Veterinary Magazine," March, 1914. G. Brekke, a Norwegian colleague, some years after the publication of the said article, told me that on one and the same day he happened to check the morphinæ hydrochloride treatment in two pregnant mares, both in the first stage of abortion. The mares were casually being inspected and treated in an indoor riding establishment. The first mare, after being injected got some attacks of agitation, during which intervals of galloping and trotting round the ménage took place, symptoms, as will be well known, morphinæ hydrochloride causes now and then, presumably when administered in too small doses. Curiously enough, this mare did not deliver her foal, whereas the other mare, not at all being treated with morphinæ hydrochloride, aborted, though being all the time comparatively easy.

Discussion.—The fact that morphia hydrochloride and laudanum exert a favourable, special calmative influence through the sympathetic nerve system on the soft muscle fibres in the tissues of the alimentary canal is a well-known experience in veterinary, as well as in human, medicine. In former days, when a practitioner I, as a rule, nearly always applied laudanum in cases of abdominal pains, whatever the cause might be. The above mentioned case, in which the injection was followed by an attack of agitation, seems to indicate that the influence of morphinæ on the central nerve system and the striated muscles is somewhat different from that on the sympathetic nerve system and the soft muscular tissue. From what is said above it is clear that the special irritant which loosens the sporadic abortion will be blunted in many cases by seasonable application of morphinæ hydrochloride. The late Professor G. Sand, of the Royal Veterinary and Agriculture College in Copenhagen in his lectures on obstetrics which I attended in 1909, called attention to the fact that, though rare in literature, cases of sporadic abortion were mentioned there as being successfully treated with various narcotica. However, from the human medicine several positive results from treatment with laudanum are better known. Especially interesting is a case which a Norwegian specialist in gynecology has told me recently concerning a woman who repeatedly had borne prematurely always on one and the same particular date in the period of pregnancy. After the first treatment with laudanum at that critical date she succeeded in carrying her child until the normal time.

I have described the above-mentioned cases in the hope that

through the greater audience of THE VETERINARY JOURNAL some more cases may be brought to light. Treatment with morphinæ hydrochloride, initiated at an early stage, i.e. before the loosening of the fœtal membranes takes place, no doubt will result in saving valuable foals as well as in preventing many mares from untoward sequels, such, for example, as sterility. Nowadays, in contradistinction to former times, the practitioner by means of motor vehicles is able to give quick attendance, a necessity, of course, for the treatment which I have just described.

Wheat Poisoning in a Cow.

By P. WELCH, M.R.C.V.S.,

Saffron Walden.

AN urgent message by 'phone early one morning a month ago, asking me to attend a five-year-old Shorthorn cow, calved two months previously and was now staggering about and grinding her teeth. The owner thought she was in a fit. I inflated the bag as it was quite empty, and after doing so was told that she had been in a barn all night gorging herself from a heap of dressed wheat. This being the case she was given immediately an aperient drench that I always carry in the car with me (ol. croton ℥ii, ol. lini ad ℥xii) to be followed in four hours by a red drink (mag. sulph. ℥xii) in a pound of treacle and half a gallon of hot water. I called in the evening about six o'clock and twelve hours after my first visit, and found her quite composed, but nothing had come from her, and no milk secreted. She was turned out in a bare meadow. Thinking she would be all right, and it being a long way from home, I did not call again until in the district three days after. I was told that the bowels did not respond to the medicine for 48 hours and that she was now all right and giving the usual amount of milk.

It may be mentioned here that it is quite a frequent occurrence to find cows down or staggering when nowhere near calving and which quickly get well and normal as soon as the udder is inflated. In this particular case, however, one might have expected tympany, but there was none.

In cases of wheat poisoning in horses nothing has been of more service to me than large doses of aloes in bolus, followed by a few hypodermic injections of arecolin.

XUM

Triple Infection in the One Subject in a Cow.

By R. PAINE, F.R.C.V.S.,
Grahamstown, S. Africa.

In May, 1923, the writer recorded two cases in which two distinct infections were revealed in slides taken from the same subject (*vide Veterinary Record* of May 26th, 1923), and the following account deals with a case in which three infections were present.

Upon July 12th, 1928, a well-bred grade Friesland cow (four years old) was reported sick, upon examination she showed almost definite symptoms of heartwater, namely, loss of appetite, dullness, tendency to walk round listlessly in a circle, and slight involuntary twitching of the eyelids. A popular local treatment consisting of a subcutaneous injection of potassium permanganate was suggested.

When seen on July 13th, 1928, the cow was much brighter, and as a precaution a blood smear was taken from the ear, this revealed a fairly heavy infection of anaplasma marginalæ. As the cow was somewhat vicious normally, she was cast for an intravenous injection of quinine hydrochlor, which is almost a specific treatment for this infection, and during the casting she exhibited a typical heartwater spasm.

During the following few days complete recovery seemed assured, but on the 16th a report was received that she had some difficulty in respiration and seemed in some distress; she was found dead the next morning, no visit having been possible on the 16th.

A *post-mortem* examination was held by the writer at 10 a.m., which revealed a quantity of clear yellow fluid along the trachea. This was thought to be some complication with the intravenous injection, although all aseptic precautions had been taken. The lungs showed distended septa and petechiæ were present on the pericardial membrane, both of which lesions are fairly constant in heartwater cases. The spleen and all the other organs were normal.

A smear was taken from the spleen and ear to ascertain whether anaplasma M. infection had completely removed, and on examination these smears showed a heavy anthrax infestation.

It is regrettable that the case cannot be clenched upon every point, for instance, one has to rely upon clinical evidence in heartwater (microscopic examination being negative), but these symptoms as well as the anaplasma smear were confirmed by a highly-skilled laboratory assistant of many years' experience with heartwater. In fact, at the time of injection upon July 13th, 1928, he remarked "if I had not seen the smear I would have sworn that this was an ordinary

heartwater case." The anthrax smears were confirmed at Onderstepoort Laboratory.

The cow was inoculated in March, 1928, with the anthrax spore vaccine for the first time, and this probably materially affected the progress of this infection. One may also assume that at the onset the heartwater infection threw the anaplasma infection into prominence.

Personally, one is inclined to consider that this experience emphasises the fact that if material were examined more frequently in apparently obvious cases much more data would be obtained which is otherwise lost.

A Case of T. Congolense in the Dog Treated by Tartar Emetic.

By J. CARMICHAEL, B.Sc., M.R.C.V.S.,
Uganda.

THE subject was a Great Dane which had accompanied his owner while hunting gorilla in the Lake Kivu area of the Eastern Congo a month previously. Physical examination revealed pronounced anæmia, emaciation, enlarged and indurated prescapular, axillary and precrural (superficial inguinal) lymphatic glands, and a scaly dermatitis, the whole accompanied by partial coma.

Temperature, 102·4°. Slight œdema in the angle of the mandibles, and the legs was noticeable.

Live blood examination revealed numerous small trypanosomes of the Congolense type.

Stained slides confirmed this diagnosis.

TREATMENT.—Owing to the extremely weak condition of the patient, drastic treatment was contra-indicated.

At about 9 a.m. he received gr. 1 of antimony potassium tartrate dissolved in 10 c.c. water intravenously.

At 4 p.m. live blood smears showed a very heavy concentration of trypanosomes in the peripheral blood, an average of five parasites being included in field of the one-sixth lens.

The following day the blood was negative to trypanosomes, and a further injection of 1 gr. in 7·5 c.c. of water was administered.

The usual course of treatment consisting of four daily injections was considered inadvisable at this juncture.

Liq. arsenicalis, tr. ferri perchlor and pot. iodide were given thrice daily.

During the succeeding eight days trypanosomes were absent from the peripheral blood, but Filaria perstans were present in varying numbers.

During this period the improvement in the general character of the patient was astonishing.

He became quite alert and active and his condition improved.

On the 12th day trypanosomes reappeared in the peripheral circulation, accompanied by depression and fever.

Two grains antimony pot. tart. was given followed by three daily injections of 1·8 grs. in 10 c.c. of water.

He stood the treatment well, although a certain degree of dyspnœa followed the injection of the drug. Filaria disappeared on the 13th day, and the condition of the dog improved rapidly.

He was alert and lively and weighed 125 lbs. when he was handed over on the 22nd day after the commencement of treatment to his owner, who was returning to Europe.

The striking improvement in the mental condition of the animal which immediately followed the sterilisation of the peripheral blood by the antimony injection was most noticeable.

Unfortunately, on the way home, the dog was allowed to have a swim in the harbour at Aden, and afterwards developed pneumonia and died.

Tonsilectomy in the Dog.

By GUY SUTTON, F.R.C.V-S.,
Kensington, London, W.

TRUE hypertrophy of the tonsil in the dog is sufficiently uncommon in our patients to merit recording. The accompanying photos of the condition require little description. The subject was a Sealyham terrier dog, 18 months old. The owner reported, " He had breathed with difficulty for the last three months." The animal was in poor condition. Respiratory movements were exaggerated and accompanied with a snore. The picture suggested that of a broken winded horse. Dr. Irwin Moore, who specialises in the diseases of the human throat, was good enough to see the case for us and lent suitable instruments for the proposed operation. There could be no question that removal of the growths was imperative. The risk of excessive salivation and hæmorrhage appeared to be the points to be kept in view. To check the former, 1-100 grain of atropine was combined with the morphia used as a narcotic and special pressure forceps capable of application to the wounds were available. There was, however, no salivation and the tumours were removed bloodlessly by the aid of a wire snare slowly tightened. The dog returned to its owner on the third day. Snoring had ceased. He breathed normally and was a comfortable dog again. The tumours were examined by Professor Hare, who reports as follows:

"The enlargement of the tonsils is due to a hyperplasia of lymphocytes. The over-production of cells appears to be of neoplastic origin,

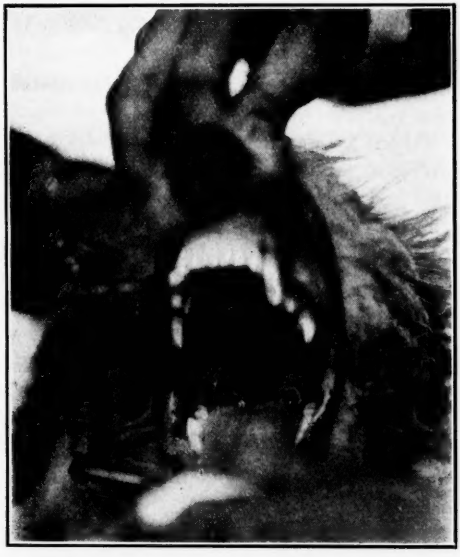

Fig. 1. Showing the hypertrophed tonsils *in situ*.

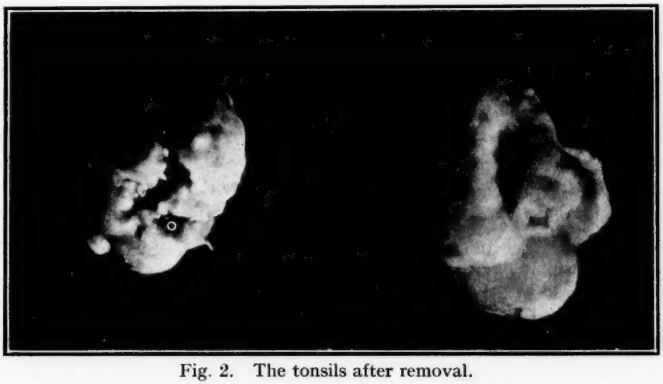

Fig. 2. The tonsils after removal.

though showing no evidence of malignancy. These simple neoplasms of lymphadenoid tissues are termed lymphomas."

For the Photographs I am indebted to my partner, Mr. Harold Stainton.

Tuberculosis of a Greyhound Bitch, with Displacement of the Alimentary Organs into the Pericardium.

By W. C. MAGUIRE, M.R.C.V.S.,
Tewkesbury.

THE subject was an eight-years-old greyhound bitch, which was a runner-up in a Waterloo Cup.

HISTORY.—About 18 months ago she gave birth to six puppies which she reared most satisfactorily. She had several litters of puppies previous to this last one. For some nine months past she was at times listless, and her appetite capricious. Nevertheless, she remained in good condition. Six months ago she suddenly went lame on the right fore-leg. It was on account of this lameness that the owner sought my advice. On examination she exhibited great pain at the elbow joint. The usual treatment for joint lameness was adopted, but without any response, and the lameness got gradually worse; also, a periarticular enlargement appeared. As the bitch was evincing great pain, I advised destruction. To this the owner consented. All through the period of lameness, which lasted for several months, the heart sounds were very dull and there was evidence of fluid in the pericardium.

POST-MORTEM APPEARANCES.—The lower extremity of the humerus, and, especially, the articular surfaces of the elbow joint, exhibited a pulp-like condition.

The spleen was three times the normal size, and was badly affected with tuberculosis. The peritoneal cavity contained about a pint of serous blood-stained fluid. There was an opening at the upper border of the diaphragm with a similar opening in the pericardium. Through this opening the stomach and bowels, with the exception of about one foot of the posterior portion of the latter, had passed, and the whole was lodged in the pericardial sac, which was three or four times its normal size. The heart showed great atrophy of its walls. I record this case as it seems extraordinary that such a condition, which must have been in existence for a considerable period during the life of the animal, did not prove inimical to life.

A Case of Chylous Ascites in an African Leopard.

By D. S. LAND, G.B.V.C.,
Superintendent, Victoria Gardens, Bombay.

IN THE VETERINARY JOURNAL of March, 1928, two cases of chylous pleurisy have been recorded—one in a German sheep dog, and the other in a cat, by Dr. Taskin.

During the course of my practice as veterinary surgeon in charge of the Zoological Collection of the Victoria Gardens, I came across a very interesting case of chylous ascites in an African leopard, which was an inmate of this garden for several years.

I give the following record of this case :—

The African leopard was one of the pair presented to the Zoological Collection by Messrs. Cawasji Dinshaw Brothers, of Aden, on February 18th, 1915. The male leopard died on August 30th, 1924.

The female leopard in question lived in these gardens for nearly 14 years, which may be considered to be the average longevity of life of leopards in captivity. It may be interesting to note that the leopard, during all these years, was never really ill, except an occasional slight indisposition.

On January 15th, 1928, I noticed that the animal was not feeding well. On examination, found the abdomen increased in volume, bulging and pendulous. Palpation revealed the presence of fluid in the belly and the case marked down as ascites. From the cage in the Park, the subject was removed to the Infirmary in the Garden ; and as a preliminary measure a dose of oleum ricini administered just to move the bowels.

On January 17th, 1928, performed paracentesis abdominis. In this connection I may state that I had to face the usual difficulty experienced in case of wild animals in securing this leopard by means of stout cotton ropes (with the assistance of about ten keepers in the cage) in right latero-dorsal position and performing the operation by puncturing the belly with trocar and canula from outside the bars of the cage, handling the instrument and working my hands through the iron bars about two inches apart.

The seat of the operation—the floor of the abdomen along the median line behind the umbilicus was clipped, washed and painted with tinct. iodi. About three pints of peritoneal fluid—milky and latescent, were removed, and the part subsequently dressed with antiseptic. The animal felt at once relieved, drank water and took the usual meat ration with relish.

Internally prescribed :—

R	Pot. Iodi.	Grs. IV.
	Pot. Nit.	Grs. V.
	Tinct. Digitalis	M. II.
	Mellis	O.S. (Q.S.)

M. fl Electuarium to be given twice a day as directed.

The next day the animal was seen doing well and moving about the cage with ease.

On January 23rd, 1928, stopped the electuary and prescribed Metagen with cod liver oil—one tablespoonful with meat.

On January 15th, 1928, found the abdomen increased in volume, and repeated the surgical operation as on January 26th, 1928, removing about two pints of fluid, which I sent to the Bombay Veterinary College. Internally prescribed the electuary. Till February 12th, 1928, the animal was all right and feeding well; but there was gradual emaciation and general weakness.

On February 13th, 1928, as the belly had again become distended, I performed paracentesis abdominis for the third time and removed three pints of peritoneal fluid of the same milky and latescent character. Suspecting the case to be tuberculosis, I sent the fluid to the Haffkine Institute for bacteriological examination and chemical analysis. Lt.-Col. Mackie, I.M.S., Director of the Haffkine Institute very kindly examined it and sent the following report on February 16th, 1928:—

Bacteriological Report.—The fluid appears to be chylous. No tubercle bacilli or any other micro-organisms. No micro-filaria seen. A few polymorphonuclear cells only present.

Chemical Report.—Reaction, neutral; sp. gravity, 1·021; total solid matter, 13·2 per cent.; albumin (coagulable protein), 1·4 per cent.; fat (ether soluble extract), 6·6 per cent.; ash, 0·2 per cent.; cholesterol present (not determined quantitatively); diastase present. There is little doubt that the fluid is almost pure chyle. It has not putrified appreciably up to now, indicating that the fluid has bactericidal powers.

This indicates interference with or damage to the lymphatic vessels within the abdomen possibly due to blockage by worms or new growth.

The animal continued to be doing well and was feeding all right, but there was gradual emaciation and general weakness. The fluid was again removed on February 20th, 1928, but the animal died on February 28th, 1928. Unfortunately, a *post-mortem* was not made at once, and owing to decomposition, no definite opinion could be formed as to the actual cause of this condition.

Translations

Arsenical Poisoning in Fowls.

By DRS. MOREAU and SIMONNET.

Bulletin de l'Académie Vétérinaire de France, May, 1928.

Six to eight litres of oats having been found in a sack on the road they were fed at about midday to some fowls. In the afternoon the fowls, instead of hurrying to get near the ration served to them as usual, were noticed to be very thirsty. A cock whose comb seemed of a purplish colour was killed at once.

At about 5 o'clock in the afternoon the symptoms were worse: one hen was dead, the others were lying round with purplish crests. They showed signs of intense diarrhœa, passing at first watery matter and then albuminous matter of a pale yellow and then greenish colour. In their efforts some of them laid eggs of which the shell was only partly formed.

At 7 o'clock 17 hens were dead. The others made no effort to enter the coops, but lay about near the troughs where they drank eagerly the milk which had been put there for them. The next day the owner picked up 20 hens, 1 turkey-hen and 1 duck all dead. He then called in the veterinary surgeon.

Fifteen hens then remained. They were huddled up in the corners almost inert, half paralysed, their combs black, the wattles darkened, and the feathers dull; those around the anus being wet by reason of the frequent diarrhœa.

Post-mortem examination showed the crop to be half full of a mixture of white and grey oats which had come from the suspected sack. The mucous membrane of the crop was congested, the peritoneum was slightly inflamed, and the intestine thickened and œdematous. The pericardium contained a little yellowish liquid and the lungs were congested.

Altogether 44 hens, 1 turkey-hen and 1 duck died, leaving the owner 8 hens, 2 turkey-hens, and 3 ducks. These did not start laying again for a long time, beginning with the ducks, which at first laid eggs without shells.

The cause of the deaths was at once thought to be poisoning, and as the suspected bag bore the name of a firm of chemical manufacturers the white powder still held in the material of the sack was analysed, and found to contain arsenic. The absence of lead, copper or chalk in the powder indicated that it was probably arsenious oxide, and not an insecticide.

Treatment of Follicular Mange in Dogs by Ultra-Violet Rays.

Paper Submitted for the Prix Trasbot, 1928.

ANONYMOUS.

Bulletin de l'Académie Vétérinarie de France, May, 1928.

THE author, considering the success of actinotherapy in human medicine in recent years for similar affections, has attempted to cure follicular mange in the same manner.

It must be noted, however, that priority in this field belongs to Professor Marotel and his pupil, Dr. Pierron, whose thesis in 1926 bears a similar title. The latter appear to have abandoned their attempts, at any rate as regards the head of the dog on account of the effect of the treatment on the eyes of the patient. This takes away much of the value of their method when we consider the number of dogs which are affected on the head.

The present author has evolved a satisfactory method to overcome this disadvantage, and has tested several different forms of ultra-violet apparatus. The animal is placed on an operating table with its limbs tied, but with its head free so that it can be brought within the rays on all sides ; the head is then placed in a suitable muzzle.

The author's results are summarised thus :—

1. Out of a total of 73 dogs treated 2 were withdrawn before the third application, the other 71 were cured.

2. Thus actino-therapy can be successfully applied to follicular mange, regarded, up to the present, as incurable.

3. The benefit of the treatment is not apparent until after five or six applications, and then the symptoms gradually disappear.

4. At least 15 applications must be made, at first general and then concentrated.

5. Actino-therapy involves no previous treatment, except the removal of crusts and grease with ether.

6. All the classical preparations, etc., should be abandoned.

Cancer of the Prepuce and Glans (Round-Celled Sarcoma), with Ganglial Metastases in a Dog.*

By PROFESSOR V. BALL and DR. P. ROSSI.

CANCER of the prepuce and glans is comparatively frequent in man. Moreover, sarcoma is exceptional, whereas carcinoma is the usual variety of cancer in the glans and prepuce. Cancer of the glans is found in middle age or later. The authors discuss the possible

* Revue Vétérinaire et Journal de Médecine Vétérinaire, July, 1928.

causes of this affection both in man and in animals, and review the relatively rarer accounts of it in veterinary literature. They then describe the following case which they observed in a dog. Their own account has been followed as closely as possible in the following translation.

Clinical History.

The dog, a seven-year-old Gordon setter, suffered from a large tumour which had set in a few months previously. The neoplasm had grown gradually, and, owing to its weight, the prepuce and glans were drawn down and swung about under the stomach. The dog was in a satisfactory state of health.

The tumour was on the internal or mucous lining of the prepuce and had no connection with the cutaneous tegument of the latter. The neoplasm was pear-shaped, firm, and painless. It was in reality hollow, being formed by the cancerous mucous membrane, and contained the glans, itself attacked by cancer, as we shall see further on. The anterior pole of the tumour corresponds with the orifice of the prepuce, and the posterior pole was near to the posterior segment of the glans. This orifice had become much narrower, being scarcely one centimetre in diameter. It was impossible to force the glans out of the prepuce. There was thus a sort of acquired phimosis, neoplastic in nature, due to the invasion and thickening of the mucous membrane of the prepuce by cancer.

Micturition was still possible, and the animal passed urine frequently, lifting the leg as usual.

No symptomatic discharge was observed, but a slight one probably existed as we noticed that the surface of the cancer was covered by a puriform exudate. Was this a very slight discharge, or did the dog lick itself? We were unable to decide.

The outside of the tumour felt irregular and rounded, and, by introducing the extremity of the small finger into the preputial cavity, it was found that the gland was also attacked by cancer.

The inguinal ganglia were hypertrophied, hard, and manifestly attacked by cancer (secondary cancerous adenopathy), pointing to generalisation by the lymphatic duct. This was confirmed by the histological examination of these ganglia.

The diagnosis made was cancer of the prepuce and glans with ganglial metastases.

The position and extent of the tumour put surgical intervention out of the question, and the animal was destroyed.

XUM

Pathological Anatomy.

The weight of the tumour with the glans was 335 grammes (about 12 ounces). The external face was covered with very visible blood-vessels. Longitudinal and ventral incision of the cancerous prepuce exposed the inner face of the neoplasm for examination. The preputial mucous membrane, completely invaded by cancer, showed an irregular rounded surface of pinkish-grey colour. The thickened prepuce formed a sort of rigid cancerous sheath whose thickness diminished from the balano-preputial ridge toward the orifice of the prepuce. This observation indicated that the cancer had originated at this ridge, and from there had been propagated towards the preputial orifice, and also on the glans. Indeed, the latter was covered by an analogous sheath 5-6 centimetres long, except on the level of the higher edge, the anterior part of the gland also being unaffected.

The cancerous surfaces were covered by a certain amount of whitish puriform exudate, which probably appeared periodically in drops at the orifice of the prepuce.

On the surfaces of section, the neoplastic tissue appeared pinkish-grey, translucent, of encephaloid aspect, and of a finely lobulated structure.

The urethra was not affected.

The cancerous layer of the prepuce can be said to have been reflected on the anterior portion of the glans, which it covered to a large extent. In other words, a second neoplastic sheath centred about the gland resulted from the propagation of the cancer from the balano-preputial ridge to the latter.

Histological sections of fragments obtained in the cancerous layer of the prepuce and gland indicated round-celled sarcoma.

The inguinal ganglia were large, hard, and lumpy. The left weighed 80 grammes (nearly three ounces), and the right 35 grammes (an ounce and a quarter). The ganglial tissue, where these organs had been cut, had the same appearance as the neoplastic layer of the prepuce and glans.

At the entrance to the pelvis a pelvic ganglion was hypertrophied, as thick as an almond, and obviously attacked by cancer. There was no visceral metastasis.

Histological examination of the hypertrophied ganglia confirmed the diagnosis of round-celled sarcoma. Indeed, the very characteristic structure of the ganglia had disappeared, and sarcomatous tissue had uniformly displaced the lymphoid tissue. There is therefore no doubt that the affection spread along the lymphatic duct.

Primitive and Bilateral Cancer of the Cervical Glands in a Cat (Lymphosarcoma, Lymphoblastic Sarcoma).

By DR. V. BALL and M. L. AUGER, of the Lyons Veterinary School.

Rev. Gen. de Méd. Vét., December, 1925.

PRIMARY glandular cancers of the cervical region, rare in man, are still more exceptional in animals—lymphosarcoma of the cervical glands notably furnishes an extreme rarity in comparative pathology, and to our knowledge no case has yet been recorded in the cat.

Does the neoplasm commence simultaneously in several glands of the cervical group or in *one only* of these so to invade successively the other glands of the region ? The second conception, more willingly admitted in human medicine, may perhaps be accepted in comparative pathology. To *neoplasic monoadenitis* rapidly ensues *regional polyadenitis* by the intervention of efferent or afferent interglandular lymphatics (by reflux of the colonised lymph in this latter case).

For the rest the unequal volume of the cancerous glands leads us to suppose the successive invasion of the units of the glandular group. The patient, a cat 18 months old, was in a very marked condition of neoplasic cachexia. At the level of each cheek there was a nodular tumoural prominence, in appearance almost symmetrical, which gave to the face a special chubby aspect. The two tumours were firm, regular on the surface and adherent to the skeleton of the face.

On the two sides the cervico-facial region was packed by a projecting glandular mass with a bosselated surface. At this place in fact, the glands were hypertrophied, hard, indolent, mobile, or adherent to each other.

There was a *primary neoplasic cervical adenopathy* of a *primitive glandular cancer*. Diagnosis was confirmed by autopsy. On each side the cervical glands sub-maxillary and preauricular unequally hypertrophied were independent or fused together by peri-adenitis, of firm consistence of a general clear yellowish red colour. On section the same colour, but a differing greyish white tint of the normal glands. One perceived also little yellowish opaque dull spots representing foci of necrosis.

The symmetrical neoplasic nodules of the cheeks of unequal size, but generally as large as a nut, are secondary, metastacic nuclei, caused by reflux of the colonised lymph into the afferent lymphatics of the region of the cheeks. The bilaterality and symmetry of these metastases are most curious. These nuclei are fused to the periosteum

by their base, but free of adherences with the skin. No *visceral metastases*, no other *adenopathies*, no *splenomegalia*, nor *leucaemic hepatomegalia*. Histologic sections of the neoplasic glands and of the secondary nodules of the cheeks showed a *lymphosarcoma* or *lymphoblastic sarcoma*, a tumour belonging to the group of *glandular cancers*. The normal structure of the glands had disappeared and been replaced by neoplasic tissue. The lymphoid follicles and sinuses no longer existed. The tumoural tissue comprised a fine conjunctive network, but more or less developed according to the points of the preparations indicated in royal blue by the *safranin picro-blue* method and cells of sarcomatous aspect which occupied the meshes of the network. These were voluminous, very numerous, of rounded or polyhedric form, with large nuclei, clear, central, rounded, oval or slightly irregular.

At places in sections of the glands slight vestiges of *lymphoid tissue* were recognisable.

The Discontinuance of the "Semaine Vétérinaire."*

THE *Semaine Vétérinaire* ends its publication. Founded by Gaston Percheron in 1885, it was at first successful. With Pion, its existence became more and more difficult, and it was in a very bad way in 1906, when M. Even undertook to save it.

One can only congratulate the last director of the *Semaine* on his disinterestedness and intentions. One can only deplore the absence of a weekly journal, like the German weeklies and the English *Record*, which would keep the French veterinary surgeon abreast of the scientific and professional movements of the world. It is certainly to be regretted that the *Semaine*, freed from all financial difficulty, did not attempt to do so. It would have been interesting to know whether, contrary to opinions as pessimistic as they are authoritative, it is impossible to find in France the few thousand readers necessary to assure the maintenance of a great veterinary periodical, and also whether it is impossible to get together an editorial staff sufficiently active, keen and disinterested, to assure its regular publication.

To the *Semaine*, its director and his editors, we address our regrets and sympathy.

* From the *Revue Générale de Médecine Vétérinaire*, July, 1928.

Vaccination Against Foot-and-Mouth Disease.

By MM. H. VALLÉE, H. CARRÉ & P. RINGARD.*

We showed in 1925[1] that it is possible to confer active immunity against foot-and-mouth disease on bovine animals by subcutaneous inoculation of sufficiently large quantities of an antigen whose virulence had been completely removed either by ageing or by the addition of formaldehyde. A little later we showed[2] what conditions were necessary to obtain a formalised antigen suitable for vaccination. Richart then reported several cases of the successful application of the method,[3] and the British Royal Commission, after a long series of experiments on guinea-pigs, reported favourably on the method as regards its application to that animal[4].

A difficulty in the technique remained to be removed, namely, how to obtain the enormous quantities of antigen necessary for the preparation of vaccines, of which some hundreds of thousands of doses might be called for in time of need, and this particularly in view of the impossibility of cultivating the virus *in vitro*. We used, for our experiments, the exfoliated patches on our subjects, but unfortunately only few of these are produced, and it would be out of the question to have recourse to such a source when large quantities of virus are required.

However, as is well known to-day, in guinea-pigs infected with foot-and-mouth disease by intradermal inoculation, the blood is found to be rich in virus between 24 and 28 hours after the beginning of the virulent evolution. The proportion of virus in the defribinated blood is such that our English colleagues found it to persist even after diluting to 1 in 5,000. We therefore supposed that at this period the whole of the animal, killed at the right time, would be, even more than the blood, a valuable source of virus.

We have, therefore, used as antigen the homogeneous pulp obtained by grinding up, in Latapie's apparatus, the carcass of a guinea-pig, whose skin, bones, gastro-intestinal organs, bile vesicle, and bladder, have been removed. The amount of pulp thus obtained is about 80 grammes from an animal of about 400 grammes. This is made up to 500 cubic centimetres with physiological solution. By adding five parts in a thousand of formalin and allowing to stand for 48 hours at 20° C., a sterile antigen is obtained which can be inoculated in all quantities into bovine animals. (We showed, in 1922, that at least two varieties of virus existed, which do not cross-immunise each other. The present research was carried out with our virus O.)

* *Revue Générale de Médecine Vétérinaire*, May, 1928.

It seemed to us that the problem which we set ourselves to resolve would be solved practically and economically if it were possible to vaccinate a bovine animal by using 50 cubic centimetres of the formalised vaccine so obtained. It is therefore this maximum dose that we have used in our experiments.

Seven bovine animals of from 8 to 18 months of age, of different breeds were chosen, and were vaccinated by subcutaneous inoculation, some by inoculation of 50 cubic centimetres at once, the others by two inoculations at an interval of 15 days, each of 25 cubic centimetres of the same antigen. In all of them the operation was followed by a fairly strong and lasting local reaction, which the observations of Ramon and our own experience lead us to suppose as favourable to a successful vaccination.

All these animals were tested together, 35 or 50 days after the vaccination, as well as a new bovine animal and 16 large guinea-pigs as controls, by the extremely severe method of inoculating intradermally into each of the subjects, 100,000 minimum infecting doses of a diluted virulent lymph. All the control animals, and only these, became infected and showed generalised lesions. The vaccinated animals supported the test without showing local lesions, even where the virulent inoculation had been made (inner face of the lower lip). All specialists in the study of foot-and-mouth disease will agree with us that the immunity conferred in this manner was particularly strong. It might have been obtained with even smaller doses of vaccine than we actually used.

The formalised vaccine, as is easily demonstrated on a guinea-pig, retains its activity for at least 45 days in the refrigerator. Experiments which we are now carrying out will show whether the sheep and the pig lend themselves as readily as the guinea-pig to the cultivation *in vivo* of the foot-and-mouth virus, and to the obtaining of large quantities of formalised virus of equal activity.

National Research Laboratories to the Veterinary Services.

REFERENCES.

(1) *Bulletin de la Société Centrale de Médecine Vétérinaire*, 1925, Vol. LXXVIII, p. 297.

(2) *Revue Générale de Médecine Vétérinaire*, 1926, Vol. XXXV, p. 129.

(3) Report on the Functioning of the Veterinary Services of the Seine-Inférieure Department in 1926. Rouen, 1927.

(4) Bedson, Maitland and Burberry. Second Progress Report of the Foot-and-Mouth Disease Research Committee, published by the Ministry of Agriculture, London, 1927.

Abstract

Veterinary Profession Has Not Lagged.

THE profession as a whole has advanced as fast as any other profession, but this fact is recognised in the official veterinarians only. The private practitioner is not accorded the recognition. The public has never been informed that there is any difference between a graduate veterinarian and the old horse doctor. Only in isolated instances has some practitioner by ability and sheer personality been able to convey this information to others. Ability and personality are really the only assets a practitioner has whereby he might gain recognition. It is a very slow process and the rank and file of the practitioners are lacking in these qualifications, even though they might be very efficient in a professional way.—DR. C. A. NELSON, Brainard, Minn.

(North American Veterinarian, Sept. /28).

Personal

Mr. Donald F. Macpherson, M.R.C.V.S., has been successful in obtaining an appointment as veterinary officer to Kenya Colony.

Mr. A. B. Kerr, M.R.C.V.S., has been appointed as one of the veterinary inspectors of the West Riding County Council.

PALATINUS, the Greyhound which won for his owner the final race for the Silver Cup (and £1,000) of the final race of the National Dog Week Stakes, is the property of Mr. Trevor King, the son of Mr. W. S. King, M.B.E., M.R.C.V.S., a well-known London Practitioner.

Notices

THE following appointments have been made by the Secretary of State for the Colonies during the month of September, 1928 :—

Name.	*Appointment.*	*Colony.*
Mr. T. G. Connell	Cadet, Administrative Service	Nigeria
Mr. W. R. Hatch	,, ,, ,,	,,
Mr. W. A. S. Cole ...	,, ,, ,,	Gold Coast
Mr. G. E. Barnard ...	,, ,, ,,	,, ,,
Mr. J. E. H. Towndrow ...	,, ,, ,,	Sierra Leone
Mr. R. B. Cardale ...	,, ,, ,,	Nigeria
Mr. E. G. Hallett	Surveyor (Framework Section)	Gold Coast
Mr. A. V. Lawes	,, ,, ,,	,, ,,
Mr. J. G. Green, M.B., Ch.B.	Medical Officer, West African Medical Staff	(Not yet allocated)
Mr. J. D. Broatch, B.Sc. (Agric.)	Assistant Superintendent, Agricultural Department	Gold Coast

Name.	*Appointment.*	*Colony.*
Mr. R. M. C. Sanderson ...	Cadet, Administrative Service	Nigeria
Mr. T. B. G. Welsh ...	,, ,, ,,	,,
Mr. A. F. Abell	,, ,, ,,	,,
Mr. J. E. Jull	,, ,, ,,	,,
Mr. A. C. Russell	,, ,, ,,	Gold Coast
Mr. R. S. Marshall, N.D.A., N.D.D., M.R.C.V.S., D.V.S.M.	Assistant Veterinary Pathologist	Nigeria
Mr. R. G. Syme	Cadet, Administrative Service	Gold Coast
Flight Officer O. J. F. Jones-Lloyd, R.A.F.	,, ,, ,,	Nigeria
Mr. F. M. Woodhouse ...	,, ,, ,,	,,
Mr. L. J. Lister	Superintendent of Education	,, (Southern Provinces)
Surgeon-Sub-Lieut. R. D. Mackenzie, M.B., Ch.B., F.R.C.P., R.N.V.R. ...	Medical Officer, West African Medical Staff (Immunologist)	Nigeria
Mr. R. M. Davies, B.Sc. (Agric.)	Superintendent, Agricultural Department	,,
Mr. F. Cooper	Assistant Surveyor, Posts and Telegraphs Department ...	,,
Mr. D. N. Walker ...	Cadet, Administrative Service	Gold Coast

Errata—September Issue.

In Mr. Noel Pillers' article, p. 462, *et seq.*, Veterinary Journal, September: In the title Smithi should have a small s.

P. 463, the legend to Fig. 1 should read: "Section of the mucous membrane of the small intestine of a bull, showing two cysts of *Globidium smithi in situ* stained by hæmotoxylin and eosin."

P. 464, Fig. 2: "Bodies from a crushed *G. smithi* after staining."

At p. 463, line 25, "*G. leucmarti*" should read "*G. leuckarti*."

In the references "Le Myste" etc., should read "Le Kyste." "*Gastrocystus*" should read "*Gastrocystis*," "*Geneesmunde*" should read "*Geneeskunde*."

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